

**NEW EQUIPMENT MAINTENANCE BUILDING
for
LEHI CITY**

at

**439 West 300 North
Lehi, Utah**

PROJECT MANUAL

BID DOCUMENTS

Lehi Maintenance Building

TABLE OF CONTENTS

DOCUMENTS

COVER SHEET
INSTRUCTIONS TO
CONTRACTORS
TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

00370	BID FORM
01010	SUPPLEMENTARY GENERAL CONDITIONS
01027	APPLICATIONS FOR PAYMENT
01040	PROJECT COORDINATION
01400	QUALITY CONTROL SERVICES
01500	TEMPORARY FACILITIES
01600	PRODUCT REQUIREMENTS
01700	PROJECT CLOSEOUT

DIVISION 2 - SITEWORK

02300	EARTHWORK
02666	POTABLE WATER SYSTEMS

DIVISION 3 - CONCRETE

03054	OLIOPHOBIC SEALER
03300	CAST-IN-PLACE CONCRETE

DIVISION 4 – MASONRY

N/A

DIVISION 5 - METALS

05500	METAL FABRICATIONS
-------	--------------------

DIVISION 6 - WOOD AND PLASTICS

06100	ROUGH CARPENTRY
06200	FINISHED CARPENTRY

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07190	WATER REPELLENTS
07200	BUILDING INSULATION
07901	JOINT SEALANTS

DIVISION 8 - DOORS AND WINDOWS

Lehi Maintenance Building

08111	STANDARD STEEL DOORS AND FRAMES
08360	SECTIONAL OVERHEAD DOORS
08521	VINYL (PVC) WINDOWS
08710	DOOR HARDWARE
08800	GLAZING

DIVISION 9 - FINISHES

09250	GYPSUM DRYWALL SYSTEMS
09900	PAINTING

DIVISION 10 - SPECIALTIES

10522 FIRE EXTINGUISHERS AND ACCESSORIES

DIVISION 11 - EQUIPMENT

N/A

DIVISION 12 - FURNISHINGS

N/A

DIVISION 13 – SPECIAL CONSTRUCTION

13125 METAL BUILDING SYSTEMS

DIVISION 14 - CONVEYING SYSTEMS

N/A

DIVISION 15 - MECHANICAL

15000	GENERAL REQUIREMENTS
15050	BASIC MATERIALS & METHODS
15055	COMMON PIPING REQUIREMENTS
15110	VALVES
15198	NATURAL GAS PIPING
15200	VIBRATION, NOISE CONTROL AND SEISMIC PROTECTION
15611	GAS-FIRED FURNACES AND RADIANT HEATERS
15900	HVAC CONTROLS

DIVISION 16 - ELECTRICAL

16123 WIRING METHODS
16140 WIRING DEVICES GENERAL
16500 LIGHTING

PROJECT: Lehi Maintenance Building
 439 West 300 North
 Lehi, Utah

1. INTRODUCTION

- ## 2. BASE BID

the total sum of:

Dollars (\$ _____).

3. ALTERNATES
Must be approved
4. EXCLUSIONS
1. 00370

5. COMPLETION TIME

- A. This time frame for this project is critical. Your completion time on this project will be of major importance and will be taken into consideration in the determination of the successful Contractor.

The Work under this Contract shall be commenced upon notice to do so and will be completed as noted below. In submitting bids on this Project, Contractor also agree that if awarded the Contract, they will pay LIQUIDATED DAMAGES in the amount of \$100.00 per day for each day after the final completion date in accordance with the Contract Documents if the Contractor's delay makes the damages applicable.

- B. The Contractor agrees to cooperate fully with the Owner, and other trades to assure completion of the total Work within the established time frames. The Contractor understands that all work must be completed as soon as possible.

6. ADDENDA

- A. The undersigned has received the Addenda, and has provided for all modification and considerations as required thereby, as follows:

NONE ()

ADDENDA No. _ , dated .

ADDENDA No. _ , dated .

- B. List of Additional Addenda: Yes () No ()

7. DESIGNATION OF SUBCONTRACTORS

The Successful Contractor will be instructed to proceed to provide a list of subcontractors within 5 days after the acceptance of the contractors bid.

8. ACCEPTANCE AND AWARD

- A. The undersigned understands that the Owner reserves the right to reject this Bid, but that this Bid shall remain open and shall not be withdrawn for a period of 60

days after the established Bid Opening Date; and that the Owner reserves the right to negotiate any changes deemed necessary before or after execution of the Contract.

- B. If written notice of acceptance of this Bid is mailed or delivered to the undersigned within 60 days after the date set for the opening of this Bid, or at any other time thereafter before it is withdrawn, the undersigned will promptly execute and deliver to the Owner a Contract prepared by the Owner in accordance with this Bid as accepted or as otherwise mutually agreed upon. Surety Bonds and Certificates of Insurance will be required within ten (10) days of notification of acceptance of this Bid.
- C. Notice of Acceptance or a request for additional information may be addressed to the undersigned at the address set forth hereinafter.

9. CONTRACTOR'S BUSINESS INFORMATION

- A. Contractor License No. _ , State of _ .
- B. Contractor is submitting this proposal on behalf of a Joint Venture; and names, license number and relevant information are given on a separate attachment hereto:

Yes () No ()
- C. Upon request, Contractor will forthwith provide appropriate documentation to substantiate and/or support any of the data given herein.

11. AFFIRMATION

Signed on this date of _ , 20 _ .

Signature Title_

(also referred to as "Contractor") INSTRUCTIONS:

- 1. Insert "XX" for affirmative or "N/A" for not applicable, as appropriate and necessary for clarity.
- 2. Identify any and all attachment sheets with Contractor's name.

END OF SECTION

Lehi Maintenance Building

SECTION 01010 – SUPPLEMENTARY GENERAL CONDITIONS

PART - GENERAL

SUMMARY OF WORK

A. Project Identification: As follows:

1. Location: 439 West 300 North , Lehi, Utah
2. Owner: Lehi City
153 East 100 North
Lehi City, UT 84043

- B. This project is to construct a new Maintenance building on Lehi City owned property in Lehi, Utah per this description and the attached drawings and specification. The attachment includes building drawings indicating the minimum size and style of building to be supplied. Also attached is a short specification outlining the building requirements. The drawings and specifications are to be considered together as the bid documents and are to be taken as a whole.

The scope of work includes the design and construction of a new building per the requirements contained in the attached drawings and specification. The contractor will be responsible to verify all existing conditions prior to the bid. The contractor will be responsible for the final design and construction of the building. Final site grading and asphalt paving shall be done by the Owner. Except for work designated to be done by the Owner, the contractor will be responsible for work done within the building footprint. Contractor is responsible for compacted fill and/or excavation as required for construction of building. Contractor shall backfill and compact footing and foundation excavation. Owner will finish site grading and asphalt after completion of building.

The attached drawings are included as a reference to show basic building concepts and building requirements and indicate the minimum size required. The contractor will be required to submit complete construction documents based upon the attached drawings for approval by the Owner prior to construction. The building supplied may be of the manufacturer's standard size but shall not be less than the minimum size shown.

A pre-bid meeting will be held on Wednesday, August 6, 2014 at 10:00 a.m. MST on location. Questions during the bid period must be submitted in writing (3) five days prior to the bid closing date. Any inadvertent information obtained from unauthorized questions will not be considered the official position of the City. Relying on such information is at the Contractor's risk.

1.2 BASE BID

- A. Base bid shall include the construction of the storage building as outlined in the bid plans and specifications.

1.3 WORK RESTRICTIONS

- A. Contractor's Use of Premises: During construction, Contractor shall have use of building site surrounding and adjacent to the area the building will be built as required for

Lehi Maintenance Building

construction. Other occupied building exist on the site, and access to them shall not be blocked by this construction. Contractor's use of premises is limited by Owner's right to perform work or other activities on the site.

1.4 TIME OF COMPLETION AND DELAY REMEDY

- A. It is the need of the City to have the project completed as soon as possible. The Contractor agrees to pay liquidated damages in the amount of \$100 per day for each day after the expiration of the Contract Time until the Contractor achieves Substantial Completion.

1.5 BONDS

A. PERFORMANCE AND PAYMENT BOND

- 1. At the time of the execution of the contract, the contractor shall provide a performance bond for 100% of the total purchase price of the contract guaranteeing performance, product and payment. The Contractor shall also provide a Payment Bond in the amount of \$25,000.

1.6 INSURANCE

A. WORKERS COMPENSATION

- 1. The contractor will be required to furnish proof that all employees involved in this project are covered by Workmen's Compensation. The City will not be liable for injuries incurred during this project.

B. CERTIFICATE OF INSURANCE

- 1. Before contract award, successful Contractor must provide a certificate of insurance certifying that the contractor will provide and maintain a policy of insurance in which Lehi City is named as an additional insured. Coverage shall be in the following amounts:
 - a. \$250,000 for bodily injury
 - b. \$500,000 for each accident occurrence
 - c. \$100,000 for property damage
- 2. If the contractor cannot obtain this insurance, the contractor shall provide a policy with a minimum coverage of \$3,000,000 in the aggregate.
- 3. The certificate must also state that no cancellation or decrease in coverage shall be made without giving the City at least 60 days prior written notice.

1.7 SAFETY

- A. Contractor shall comply with the current OSHA *Standards*. The owner intends to inspect the job site regularly for compliance with the standard. Failure to comply with the requirements of the standards may result in the Owner issuing a cease and desist order

Lehi Maintenance Building

until such time as the noted violations are corrected. Contractor will be held responsible for all costs resulting from safety violations.

1.8 MATERIALS

- A. Material furnished to Lehi City shall be certified as new and must meet all current State and Federal applicable building codes and safety regulations.
- B. Bids shall include all materials and equipment necessary for complete design and construction of a finished building.

1.9 WARRANTY

- A. Unless noted otherwise, Contractor shall provide a general written one year warranty for the replacement of all defective materials, including labor and travel that are used in this project. See individual specification sections for additional warranties. All warranties shall be from date of substantial completion.

1.10 BUILDING CODES

- A. The building shall be designed and constructed according to all current applicable State, Local and National Codes.

1.11 PROJECT DESCRIPTION

- A. It is the intent of this contract to design and construct a new maintenance building that meets all of the stated size requirements and material requirements of this specification. The project includes design and engineering, earthwork, concrete and rebar, pre-engineered steel building, interior finish work, standing seam roofing, mechanical and electrical. Unless approved by the Owner prior to bid, only the materials listed in the specification may be used. If the Contractor wishes to use materials in lieu of those listed, Contractor must obtain approval prior to bid. All accepted alternate materials will be issued in an addendum prior to bid. Upon award of bid, only materials listed in this specification or materials that have been given prior approval for this project will be allowed. Any other submittals provided after award of bid will be rejected. All submittals which meet the above criteria will be considered responsive.

1.14 DIMENSIONS

- A. The building footprint shall be 60 feet by 100 feet. See the attached plan for building layout.

1.15 DESIGN PARAMETERS

- A. The building shall meet the following criteria.
 - 1. It is intended to construct a building of the footprint size, with retaining wall height and an eave height of materials indicated in the attached drawings.
 - 2. Contractor may propose an alternate method of construction other than those listed. Any proposed alternate methods of construction not listed must be submitted prior to bid for approval. Approved alternate methods of construction will be issued as an addendum.
 - 3. The exterior of the building enclosure must be maintenance free.
 - 4. Building shall have vertical sides with minimum 18 foot eave heights as shown.

1.16 CONSTRUCTION DOCUMENT SUBMITTAL

- A. The contractor will be required to prepare and submit complete engineered construction plans for review and approval by the Owner and the Lehi Building Official. Prior to commencement of construction, contractor shall submit 3 sets of plans for review by the Owner and the Lehi Building Official. It will be the responsibility of the architect or engineer of record to verify the bid elements and provide the necessary engineered plans and calculations for review and approval. Changes required to the bid documents will be addressed as change orders as required. Construction plans shall bear stamps of licensed professionals as required by the State of Utah. Final plan submittal shall include compliance as required with current building and fire codes. A typical construction set will include the following;
 - 1. Cover sheet indicating project name, location and project number.
 - 2. Code analysis and special inspection form.
 - 3. Architectural and engineering plans based on bid documents.
 - 4. Pre-engineered plans for the metal building (as applicable).
 - 5. Soils Report to determine soil bearing capacity.
 - 6. Structural calculations.
 - 7. Energy analysis (ComCheck).
- B. It will be the contractor's responsibility to follow through with the review and approval process to ensure that the project remains on schedule.
- C. The stamped set, approved by the Lehi City Building Official, shall be maintained on site during the duration of the construction of the project.

1.17 CERTIFICATE OF OCCUPANCY

- A. Contractor will be required to arrange for all inspections and letters of acceptance necessary to allow Owner to obtain a Certificate of Occupancy from the Lehi City Building Official. These minimums usually include:
 - 1. A code inspection report recommending that a certificate of occupancy be issued.
 - 2. A code inspection report recommending that final approval of the project be given.
 - 3. A final report from the special inspection agency.
 - 4. A Certificate of Fire Clearance from the City Fire Marshal.
- B. Final payment will be made after these documents have been submitted and accepted by the State Building Official and a Certificate of Occupancy issued.

1.18 DESIGN LOADS

- A. Building design loads shall be as follows:
 - 1. Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for the following wind-uplift resistance:
 - a. Class 90. With additional requirements for resistance to 115 mph (ultimate) winds.

Lehi Maintenance Building

2. Snow Load: Site specific. The ground snow load must be calculated based upon Section 1608.1.2 of the Utah Amended Code with regional snow load factors compliant with Table 1608.1.2(a). Snows loads shown per project are site specific based upon the above tables. Contractor to verify compliance.
 - a. Ground Snow: 43 psf
 - b. Roof Snow Load: 30 psf
3. Wind: Site specific. Wind speed per local jurisdiction. Exposure as required by ASCE 7.
4. Seismic: Site specific. As required by the IBC.
5. Floor: 400 lb/sq ft.
6. IBC Occupancy Classification: S-1
7. Use: Equipment Maintenance
8. Construction Type: VB
9. Occupancy – 9 office occupancy, 11 maintenance area.
10. Soil Bearing Capacity: Per soils reports.

1.19 SITE WORK

- A. Contractor shall be responsible for all site work related to construction of the building only, excavation, backfilling of footing trenches, etc. Owner shall be responsible for construction related to asphalt paving.

PART - PRODUCTS (Not Applicable)

PART - EXECUTION (Not Applicable)

END OF SECTION 01010

SECTION 01027 – APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 CONTRACT MODIFICATION PROCEDURES

Upon the Owner's approval of a proposal from the Contractor, submitted either in response to a Proposal Request issued by the Owner or as a request for change from the Contractor, the Owner will issue a Change Order for all changes to the Contract Sum or Contract Time.

When the Owner and Contractor disagree on the terms of a proposal, the Owner may issue a Construction Change Directive, instructing the Contractor to proceed with the change. The Construction Change Directive will contain a description of the change, and designate the method to be followed to determine changes to the Contract Sum or Contract Time.

1.2 PAYMENT PROCEDURES

Submit a Schedule of Values which breaks down the Contract Sum into at least one line item for each Specification Section. Correlate the Schedule of Values with the Contractor's Construction Schedule.

1. Submit Schedule of Values with the first Application for Payment.

Submit 1 copy of each Application for Payment. Payments to be made at minimum 30 day intervals.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01027

SECTION 01400 - QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.1 QUALITY CONTROL

- A. Quality-control services include inspections, tests, and related actions including reports, performed by Contractor, by independent agencies, and by governing authorities.
- B. Owner will employ and pay a qualified independent testing agency to perform tests and inspections specified in other Sections, and those required by authorities having jurisdiction.

Contractor is responsible for scheduling inspections and tests.

- C. Retesting: Contractor shall pay for retesting where results of inspections and tests prove unsatisfactory and indicate noncompliance with requirements.
- D. Auxiliary Services: Cooperate with agencies performing inspections and tests. Provide auxiliary services as requested. Notify agency in advance of operations requiring tests or inspections, to permit assignment of personnel. Auxiliary services include the following:

Access to the Work.

Incidental labor and facilities to assist inspections and tests.

Adequate quantities of samples of materials that require testing, and assisting in taking samples.

Facilities for storage and curing of test samples.

Security and protection of samples and test equipment.

- E. Duties of Testing Agency: Testing agency shall cooperate with Architect and Contractor in performing its duties. Agency shall provide qualified personnel to perform inspections and tests.

Agency shall notify Architect and Contractor of irregularities or deficiencies observed in the Work during performance of its services.

Agency shall not release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

Agency shall not perform duties of Contractor.

- F. Submittals: Testing agency shall submit a certified written report of each inspection and test to the following:

Owner.

Architect.

Contractor.

Structural engineer.

Authorities having jurisdiction, when authorities so direct.

Report Data: Reports of each inspection, test, or similar service shall include at least the following:

Lehi Maintenance Building

Date of issue.
Project title and number.
Name, address, and telephone number of testing agency.
Dates and locations of samples and tests or inspections.
Names of individuals making the inspection or test.
Designation of the Work and test method.
Identification of product.
Complete inspection or test data.
Test results and an interpretation of test results.
Ambient conditions at the time of sample taking and testing.
Comments or professional opinion on whether inspected or tested Work complies with requirements.
Name and signature of laboratory inspector.
Recommendations on retesting or reinspection.

Qualifications for Service Agencies: Engage inspection and testing service agencies that are prequalified as complying with the American Council of Independent Laboratories' "Quality Assurance Manual" and that specialize in the types of inspections and tests to be performed.

Each agency shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01400

SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Standards: Comply with NFPA 241, "Standard for Safeguarding Construction, Alterations, and Demolition Operations"; ANSI A10 Series standards for "Safety Requirements for Construction and Demolition"; and NECA Electrical Design Library's "Temporary Electrical Facilities."
 - 1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.
- B. At the earliest possible time, change over from use of temporary utility services to use of permanent utilities.
- C. Remove temporary facilities and controls before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Provide new materials and equipment for construction of temporary facilities and controls.

PART 3 - EXECUTION

TEMPORARY UTILITIES

Provide temporary services to project site for use during construction unless Owner can provide services. Arrange for and coordinate service(s) with local utility companies.

Contractor shall also pay use charges for temporary utilities.

Provide temporary heat for curing or drying of work from adverse effects of low temperatures. Use of gasoline-burning heaters and open-flame heaters is not permitted.

Provide temporary sanitary facilities. Comply with regulations and health codes for type, number, location, and maintenance of facilities.

TEMPORARY CONSTRUCTION FACILITIES

Provide field offices, storage trailers, and other support facilities as necessary for efficient prosecution of the Work.

Temporary facilities located within the construction area or within 30 feet (9 m) of

Lehi Maintenance Building

building lines shall be of noncombustible construction.

Provide temporary enclosures for protection of construction and workers from exposure and inclement weather and for containment of heat.

Collect waste daily and dispose of waste off-site according to local ordinances, when containers are full.

Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material according to applicable laws and regulations.

TEMPORARY CONTROLS

Provide temporary fire protection until permanent systems supply fire-protection needs.

Provide adequate numbers and types of fire extinguishers.

Store combustible materials in fire-safe containers in fire-safe locations.

Prohibit smoking in hazardous fire-exposure areas.

Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

Provide temporary barricades, warning signs, and lights to protect the public and construction personnel from construction hazards. Enclose construction area(s) with fence(s) with lockable entrance gates, to prevent unauthorized access.

Provide temporary environmental controls as required by authorities having jurisdiction including, but not limited to, erosion and sediment control, dust control, noise control, and pollution control.

END OF SECTION 01500

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Provide products of same kind from a single source.
- B. Deliver, store, and handle products according to manufacturer's written instructions, using means and methods that will prevent damage, deterioration, and loss, including theft.

Schedule delivery to minimize long-term storage and to prevent overcrowding construction spaces.

Deliver in manufacturer's original sealed packaging with labels and written instructions for handling, storing, protecting, and installing.

Inspect to ensure compliance with the Contract Documents and to ensure items are undamaged and properly protected.

Store heavy items in a manner that will not endanger supporting construction.

Store items subject to damage above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

Provide items that comply with the Contract Documents, are undamaged, and are new at the time of installation.

Provide products and equipment complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.

Do not attach manufacturer's labels or trademarks, except for required nameplates, on surfaces exposed to view in occupied spaces or on the exterior.

Select products as follows:

Where these Specifications name only a single product or manufacturer, provide the item indicated. No substitutions will be permitted.

Where these Specifications name 2 or more products or manufacturers, provide 1 of the items indicated. No substitutions will be permitted.

Where products or manufacturers are specified by name, accompanied by the term "or equal," comply with provisions concerning "product substitutions" to obtain approval for use of an unnamed product or manufacturer.

Where these Specifications describe a product and list characteristics required, with or without naming a brand or trademark, provide a product that complies with the characteristics and other requirements.

Where these Specifications require compliance with performance requirements,

Lehi Maintenance Building

provide products that comply and are recommended in writing by the manufacturer for the application.

Where these Specifications require compliance with codes, regulations, or reference standards, select a product that complies with the codes, regulations, or reference standards.

Unless otherwise indicated, Owner will select color, pattern, and texture of any product from manufacturer's full range of options.

2.2 PRODUCT SUBSTITUTIONS

Reasonable and timely requests for substitutions will be considered. Substitutions include changes proposed by the Contractor after award of the Contract, in products and methods of construction required by the Contract Documents.

Do not submit unapproved substitutions on Shop drawings.

Submit 1 pdf copy of each request for product substitution. Identify product to be replaced, provide complete documentation showing compliance of proposed substitution with all specified requirements, and include the following:

A full comparison with the specified product.

A list of changes to other Work required to accommodate the substitution.

Any proposed changes in the Contract Sum or Contract Time should the substitution be accepted.

Owner will review the proposed substitution and notify Contractor of its acceptance or rejection.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

SECTION 01700 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 CLOSEOUT SUBMITTALS

- A. Record Drawings: Maintain a set of Contract Drawings as Record Drawings. Mark to show installation that varies from the Work originally shown.
- B. Record Specifications: Maintain one copy of the Project Manual, including addenda, as Record Specifications. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications.
- C. Operation and Maintenance Data: Provide a CD containing operations and maintenance data. Mark identification on CD. Include the following:
 - Emergency instructions.
 - Spare parts list.
 - Copies of warranties.
 - Wiring diagrams.
 - Shop Drawings and Product Data.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

EXAMINATION AND PREPARATION

Examine substrates and conditions for compliance with manufacturer's written requirements including, but not limited to, surfaces that are sound, level, and plumb; substrates within installation tolerances; surfaces that are smooth, clean, and free of deleterious substances; and application conditions within environmental limits. Do not proceed with installation until unsatisfactory conditions have been corrected.

Prepare substrates and adjoining surfaces according to manufacturer's written instructions, including, but not limited to, the application of fillers and primers.

CUTTING AND PATCHING

Do not cut structural members without prior written approval of Architect.

For patching, provide materials whose installed performance will equal or surpass that of existing materials. For exposed surfaces, provide or finish materials to visually match existing adjacent surfaces to the fullest extent possible.

INSTALLATION

Comply with manufacturer's written instructions for installation. Anchor each product securely in place, accurately located and aligned. Clean exposed surfaces and protect from damage. If applicable, prepare surfaces for field finishing.

Lehi Maintenance Building

Comply with NFPA 70 for installation of electrically operated equipment and electrical components and materials.

FINAL CLEANING

Clean each surface or item as follows before requesting inspection for certification of Substantial Completion:

- Remove labels that are not permanent.
- Clean transparent materials, including mirrors. Remove excess glazing compounds.
- Replace chipped or broken glass.
- Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean.
- Vacuum carpeted surfaces and wax resilient flooring.
- Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication.
- Clean plumbing fixtures. Clean light fixtures and lamps.
- Clean the site. Sweep paved areas; remove stains, spills, and foreign deposits.
- Rake grounds to a smooth, even-textured surface.

CLOSEOUT PROCEDURES

Request Substantial Completion inspection once the following are complete:

- Advise Owner of pending insurance changeover requirements.
- Submit Record Drawings and Specifications, maintenance manuals, warranties, and similar record information.
- Deliver spare parts, extra stock, and similar items.
- Changeover locks and transmit keys to Owner.
- Complete startup testing of systems and instruction of operation and maintenance personnel.
- Remove temporary facilities and controls.
- Complete final cleanup.
- Touch up, repair, and restore marred, exposed finishes.
- Obtain final inspections from authorities having jurisdiction.
- Obtain certificate of occupancy.

Upon receipt of a request for inspection, Owner will proceed with inspection or advise Contractor of unfilled requirements. Owner will advise Contractor of items that must be completed or corrected before the project will be accepted.

Arrange for each installer of equipment that requires operation and maintenance to provide instruction to Owner's personnel. Include a detailed review of the following:

- Startup and shutdown.
- Emergency operations and safety procedures.
- Noise and vibration adjustments.
- Maintenance manuals.
- Spare parts, tools, and materials.
- Lubricants and fuels.
- Identification systems.
- Control sequences.

Lehi Maintenance Building

Hazards.

Warranties and bonds.

Request inspection for certification of final acceptance and final payment, once the following are complete:

Submit final payment request with releases of liens and supporting documentation. Include insurance certificates.

Submit a copy of the Substantial Completion inspection list stating that each item has been completed or otherwise resolved for acceptance.

Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion.

Submit consent of surety to final payment.

Owner will reinspect the Work on receipt of notice that the Work has been completed.

On completion of reinspection, Owner will notify Contractor of acceptance of the project. If the Work is incomplete, Owner will advise Contractor of the Work that is incomplete or obligations that have not yet been fulfilled.

END OF SECTION 01700

Lehi Maintenance Building

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. All work shall conform to the recommendations provided in the soils report.
- B. Work includes preparing and grading subgrades, excavating and backfilling for building. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by Owner. Unauthorized excavation and remedial work shall be at Contractor's expense.
- C. Contractor shall be responsible for all site work related to construction of the building only, excavation, backfilling of footing trenches, etc. Owner shall be responsible for construction related to asphalt paving.
- D. For purposes of this bid, Contractor shall assume the removal of existing 4" asphalt paving as required for the new building. Contract will be modified in case of differing conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

Satisfactory Soil: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, or other deleterious matter. In addition, all materials shall conform to the recommendations included in the soils report.

Unsatisfactory Soil: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

Backfill and Fill: Satisfactory soil materials per soils report.

Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, ASTM D 2940, with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve. Material shall comply with the recommendations included in the project soils report. Should conflicts exist, the most stringent requirement shall be followed with no additional cost to the Owner.

Bedding: Subbase materials with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve. Material shall comply with the recommendations included in the project soils report. Should conflicts exist, the most stringent requirement shall be followed with no additional cost to the Owner.

PART 3 - EXECUTION

EARTHWORK

Lehi Maintenance Building

Protect subgrades and foundation soils from softening and damage by water, freezing temperatures, or frost.

Excavate to subgrade elevations regardless of character of materials and obstructions encountered.

Excavate for structures, building slabs, pavements, and walkways. Trim subgrades to required lines and grades.

Utility Trenches: Excavate trenches to indicated slopes, lines, depths, and invert elevations. Maintain 12 inches of working clearance on each side of pipe or conduit.

1. Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
2. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.

When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface, pulverize, moisture-condition or aerate soil, and recompact the scope.

Place backfill and fill in layers not more than 8 inches in loose depth at optimum moisture content. Compact each layer under structures, building slabs, pavements, and walkways to 95 percent of maximum dry density according to ASTM D 1557; elsewhere to 90 percent.

Grade areas to a smooth surface to cross-sections, lines, and elevations indicated. Grade areas within building lines to plus or minus 1/2 inch.

Under slabs-on-grade, place drainage fill on prepared subgrade and compact to required cross-section and thickness.

Allow testing agency to inspect and test each subgrade and each fill or backfill layer and verify compliance with requirements.

Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

Lehi Maintenance Building

SECTION 02666 – POTABLE WATER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes potable water systems work.

1.2 QUALITY ASSURANCE:

- A. Codes and Standards:
 - 1. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of potable water system materials and products.
 - 2. Water Purveyor Compliance: Comply with requirements of Purveyor supplying water to project, obtain required permits and inspections.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data and installation instructions for potable water system materials and products.
- B. Maintenance Data: Submit maintenance data and parts list for potable water system materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 1.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

- A. Approved Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Plastic line markers
 - a. American Marking Corp.
 - b. Seton Name Plate Corp.
 - 2. Gate Valves:
 - a. Clow Corp; Valve Div.
 - b. Dresser Mfg.; Div. of Dresser Industries.
 - c. Fairbanks Co.
 - d. Kennedy Valve; Div. of ITT Grinnell Valve Co. Inc.
 - e. Stockham Valves and Fittings Inc.
 - f. Waterous Co.

2.2 IDENTIFICATION:

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- A. Underground-Type Plastic Line Markers: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide blue tape with black printing reading "CAUTION WATER LINE BURIED BELOW".
- B. Nonmetallic Piping Label: If nonmetallic piping is used for water service, provide engraved plastic laminate, label permanently affixed to main electrical meter panel stating "THIS STRUCTURE HAS A NONMETALLIC WATER SERVICE".

2.3 PIPES AND PIPE FITTINGS:

- A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in potable water systems. Where more than one type of materials or products are indicated, selection is Installer's option.
- B. Piping: Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated.
 - 1. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 40 pipe, with plain ends for solvent-cemented joints with ASTM D 2467, Schedule 40, socket type fittings.
 - 2. PVC Pipe: Ultra Blue AWWA C909 Class 200 Pipe with ductile iron fittings.

2.4 VALVES:

- A. Gate Valves: AWWA C500, 175 psi working pressure, threaded, flanged, hub, or other end configurations to suit size of value and piping connection. Provide inside screw type for use with curb valve box, iron body, bronze-mounted, double disc, parallel seat, non-rising stem.

2.5 ACCESSORIES:

- A. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.
 - 1. Clamps, Straps, and Washers: Steel, ASTM A 506.
 - 2. Rods: Steel, ASTM A 575.
 - 3. Rod Couplings: Malleable-iron, ASTM A 197.
 - 4. Bolts: Steel, ASTM A 307.
 - 5. Cast-Iron Washers: Gray-iron, ASTM A 126.
 - 6. Thrust Blocks: Concrete, 2,500 psi.
 - 7. Yard Hydrants: Non-freeze yard hydrants, inlet and outlet as indicated, bronze casing, cast-iron or cast-aluminum casing guard, key-operated, and tapped drain port in valve housing.
 - 8. Valve Pits: Valve pits as indicated, constructed of poured-in-place or precast concrete. Construct of dimensions indicated with manhole access, ladder, and drain.

Lehi Maintenance Building

Provide sleeves for pipe entry and exit, provide waterproof sleeve seals.

9. Valve Boxes: 2 piece, cast iron, screw adjustable sleeves, 5-1/4 inch shaft, with drop lid.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine areas and conditions under which potable water system's materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF IDENTIFICATION:

- A. During back-filling/top-soiling of underground potable water piping, install continuous underground-type plastic line markers, located directly over buried lines at 6" to 8" below sub grade

3.3 INSTALLATION OF PIPE AND PIPE FITTINGS:

- A. Pipe:
 1. Install PVC pressure piping according to AWWA M23 or ASTM D 2774 and ASTM F 1668 and in accordance with instructions from water purveyor.
 2. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668.
- B. Depth of Cover: Provide minimum cover over piping of 12" below average local frost depth or 42" below finished grade, whichever is greater.
- C. Water Main Connection: Arrange and pay for tap in water main, of size and in location as indicated, from water Purveyor.
- D. Water Service Termination: Terminate potable water piping 5'-0" from building foundation in location and invert as indicated. Provide temporary pipe plug for piping extension into building, by work of Division 15.
 1. Mark location with surface marker.

3.4 INSTALLATION OF VALVES:

- A. Install valves with stems pointing up. Provide valve box over underground valves.

3.5 FIELD QUALITY CONTROL:

- A. Piping Tests: Conduct piping tests before joints are covered, and after thrust blocks have sufficiently hardened. Fill pipeline 24-hrs. prior to testing, and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than 200 pounds per square inch for 2-hrs.

Lehi Maintenance Building

1. Test fails if leakage exceeds 2-qts per hour per 100 gaskets or joints, irrespective of pipe diameter.
2. Increase pressure in 50 psi increments and inspect each joint between increments. Hold at test pressure for one hour, decrease to 0 psi. Slowly increase again to test pressure and hold for one more hour.

3.6 ADJUSTING AND CLEANING:

- A. Disinfection of Potable Water System: Flush pipe system with clean potable water until no dirty water appears at point of outlet. Fill system with water-chlorine solution containing at least 50 ppm of chlorine. Valve off system and let stand for 24- hrs minimum. Flush with clean potable water until no chlorine remains in water coming from system.
 1. Repeat procedure if contamination is present in bacteriological examination.
- B. Disinfection of Water Mains: Flush and disinfect in accordance with AWWA C651 "Standard for Disinfecting Water Mains".
 1. Contractor shall submit written verification to Project Manager stating, disinfection has been completed in strict compliance with specification for this project and with jurisdiction having authority over water system.

END OF SECTION 02666

SECTION 03054 – OLIOPHOBIC SEALER

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. This section specifies a topical concrete waterproofing system of all interior concrete floor slabs. This system utilizes a clear, breathable, high performance silane concrete sealer with an oliophobic additive for protecting new concrete surfaces. This low VOC compliant treatment forms an effective chloride screen that reduces surface erosion and corrosion of rebar and seals out water, chloride ions, and acids thereby reducing staining caused by motor oils and grease.
- B. This section includes: Furnishing of all labor, materials, services and equipment necessary for the supply and installation of waterproofing placement as indicated on drawings and as specified. Related Work: Documents affecting work of this Section include, but are not necessarily limited to: General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
- C. This section includes: provision of concrete curing, hardening, and sealing and cleaning of concrete surface.
- D. All concrete surfaces exposed to view shall have the application of this sealer.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.
- B. Product data: Within 35 calendar days after the contractor has received the owner's notice to proceed, submit the following material:
 - 1. Materials list of items proposed to be provided under this section.
 - 2. Manufacturer's specifications, test data and other data required to prove compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Owner, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.4 PRODUCT HANDLING:

- A. Protect the materials of this Section before and after installation. Protect the work and materials of all other trades.
- B. In the event of damage, immediately make replacements and repairs to the approval of the Owner and at no additional cost to the owners.
- C. Store materials in clean, dry area in accordance with manufacturer's instructions. Keep containers sealed until ready for use. Keep from freezing.

PART 2- PRODUCTS

2.1 HARDENING/SEALING AGENT:

- A. Where concrete hardener and sealer is called for on the Drawing or is specified herein, provide one of the products as follows:
 - 1. Hydrozo 100 Plus
 - 2. Stand Off SLX 100
 - 3. Or, pre-approved equal.
- C. Chemical Resistance: The manufacturer shall provide a chemical resistance guide listing test results by independent laboratories.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS:

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION:

- A. Prepare the surface in strict accordance with the manufacturers recommendations as approved by the Owner.
- B. Cure concrete in accordance with manufacturer's instructions and as specified in Section 03300.

3.3 APPLICATION:

- A. Test a small area of the surface at least 4' by 4' square on a representative area of concrete slab and stem wall. Allow 5 – 7 days for the product to fully react before evaluating for the desired results and coverage rates. Keep test area available for evaluation throughout the sealing project.
- B. Application should be made once the concrete has achieved 3000 psi strength.
- C. Clean all surfaces of all sand, surface dust, and dirt, oil, grease, chemical films or coatings, and other contaminants prior to application. Use waterblast, sandblast, or shotblast as necessary to achieve a clean surface condition.
- D. Crack control, caulking, patching, and expansion joint sealants should be installed prior to application of the sealer. Paint any line stripping prior to the application of product. Allow adequate curing time following sealant manufacturer's recommendations.
- E. Application shall be made according to manufacturer's recommendations. Apply in a single, saturating application. Brush and/or broom drips and heavy runs thoroughly

Lehi Maintenance Building

into the surface. All concrete surfaces shall be kept wet as required for complete coverage and penetration of product.

- F. Achieve waterproofing without changing the natural appearance of the material, except for a latent waxy sheen on smooth troweled surfaces.
- G. Do not dilute sealer.
- H. Do not apply sealer if air temperature is expected to be above 90 degrees F or below 40 degrees F at the time of or within 24 hours after application or when rain is expected within 4 hours of application. Avoid application on hot, windy days.
- I. Apply at least two applications of sealer. Apply the second coat within a few minutes after the first coat has penetrated and appears dry. Determine if additional applications of concrete sealer are necessary by testing surfaces in accordance with manufacturer's instructions.
- J. Protect surfaces from traffic until sealer has cured.

3.4 WARRANTY:

- A. Upon Completion of the work, as a condition of its acceptance, furnish the owner a written warranty signed by an officer of the manufacturer.

END OF SECTION 03054

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes but is not limited to the following:
 - 1. Foundations and footings.
 - 2. Slabs-on-grade.

1.3 SUBMITTALS

- A. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, joint systems, curing compounds, and others if requested by Owner.
- B. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.
- C. Laboratory test reports for concrete materials and mix design test.
- D. Material certificates in lieu of material laboratory test reports when permitted by Owner. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of:
 - 1. International Building Code, Chapter 19.
 - 2. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 4. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service: Provide a qualified independent testing agency , acceptable to Owner, to provide testing and material evaluation tests.
- C. Special Inspection: Owner will provide special inspection services for concrete work as required by Contract Documents and IBC Chapter 17..

1.5 WARRANTY

- A. Provide two year written guarantee to the End User, in form approved by the Owner to promptly remove and/or repair defective concrete (cracking, spalling, pitting or

honeycombing) as directed by Owner and at Contractor's expense. New replacement work shall carry a similar new two year written guarantee. Guarantee shall start from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint and exposed form tie system shown on drawings. Plywood shall meet U.S. Product Standards P51-74 for doug fir plywood "Plyform", exterior grade.
- A. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer exterior corners and edges of permanently exposed concrete 3/4" by 3/4".

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I / II.
- B. Fly Ash: Conform to ASTM C 618 Class C or F.
- C. Normal-Weight Aggregates: ASTM C 33 Class 4S.
- D. Water: Potable.
- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Air-Entraining Admixture: ASTM C 260
- G. Water-Reducing Admixture: ASTM C 494, Type A.
- H. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.

2.4 PROPORTIONING AND DESIGNING MIXES

- A. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
 - 1. Footings, 3000 psi 28-day compressive strength; water-cement ratio: 0.5 maximum.
 - 2. Foundations, 4000 psi, 28-day compressive strength; water-cement ratio: 0.5 maximum.

3. Slabs-on-grade and all other concrete: 4,000 psi, 28-day compressive strength; water-cement ratio: 0.5 maximum.
4. Fly Ash Conform to ASTM C 618 Class C or F.
5. Air-entrainment requirements: exterior exposed to freeze thaw 5.5 to 7%, 2 to 4% elsewhere
6. Slump Limits: Not more than 4 inches at point of placement.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with ACI 347 limits for class A concrete exposed to view and class C concrete elsewhere.
- B. Install construction, isolation and control joints.
- C. Provide standard 3/4" chamfer at all exposed corners and edges unless noted otherwise.
- D. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades.

3.3 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

3.4 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

3.5 CONCRETE PLACEMENT

- A. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- B. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as

specified. Deposit concrete to avoid segregation at its final location. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.

- C. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
- D. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified. Concrete should not be placed when temperature is above 95.F unless approved by the Architect/Engineer.

3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work.
- B. Smooth-Formed Finish: Provide a smooth-formed architectural finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 MONOLITHIC SLAB FINISHES

- B. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic tile, paint, or another thin film-finish coating system.
- C. Non-slip Broom Finish: Apply a non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.10 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete slabs from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

3.11 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after maintaining not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing operations are started and protection operations are maintained.

3.12 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: Owner to provide a testing agency to perform material tests, special inspections and to submit test reports. Contractor to coordinate with testing agency for sequence of work and inform testing agency when work is ready for testing and inspections.

END OF SECTION 03300

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. SUBMITTALS

1. Shop Drawings showing details of fabrication and installation.

1.2 SUMMARY

A. This Section includes the following metal fabrications:

1. Rough hardware.
2. Loose bearing and leveling plates.
3. Shelf and relieving angles.
4. Miscellaneous framing and supports for the following:
 - a. Overhead doors.
 - b. Applications where framing and supports are not specified in other sections.
 - c. Miscellaneous steel trim, including the following:
 - 1) Edgings.
 - 2) Floor plate and supports.
 - 3) Pipe bollards.

PART 2 - PRODUCTS

A. METALS

1. Steel Plates, Shapes, and Bars: ASTM A 36.
2. Rolled Steel Floor Plates: ASTM A 786.
3. Steel Pipe: ASTM A 53, standard weight (Schedule 40), galvanized finish.

B. GROUT

1. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.

C. FABRICATION

1. Fabricate pipe bollards from Schedule 40.

D. STEEL AND IRON FINISHES

1. Hot-dip galvanize steel fabrications at exterior locations.
2. Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning," and paint with a rust-inhibitive primer complying with performance requirements of FS TT-P-664.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack.
- B. Fit exposed connections accurately together to form hairline joints.
- C. Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- D. Install pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to floor and wall or column with drilled-in expansion anchors.
- E. Anchor bollards in concrete and fill solidly with concrete, mounding top surface.

END OF SECTION 05500

Lehi Maintenance Building

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included

1. This Section of the Work includes, but is not limited to the following:
 - a. The work incidental to laying out and the general progress of the structure, including furnishing in place of batter boards; temporary barricades for protection of the work, workmen and the public; temporary stairs and ladders; refuse chutes, etc.
 - b. Furnishing in place of all wood bucks, wood nailing blocks, strip grounds and wood furring as shown in the Drawings or as may be required for carpentry work of other trades.
 - c. Furnishing and placing of all rough carpentry, framing, etc., as required and shown in the Contract Drawings and/or specified herein.

B. Related Work Described Elsewhere

Section 06200 - Finish Carpentry

PART 2 – PRODUCTS

2.1 GENERAL

The following shall apply to respective rough carpentry wood items on this Project where called for in the Contract Drawings and/or as specified herein:

A. All lumber shall conform to the following requirements:

1. New lumber for each specific purpose shall be sound, thoroughly commercially dry lumber, or kiln-dried if the nature of the work requires, and free of all defects not permissible under the grading rules of the Association under whose classification it falls.
2. All lumber furnished shall be of a quality equal or superior to the minimum requirements of the specified grade for the species furnished. The current grading rules of the Association of Lumber Manufacturers producing the materials specified and recognized by the National Lumber Manufacturing Association shall govern the grading of all rough and finish lumber furnished under this Specification.
3. Each piece of lumber, or bundle in case of bundled stock, shall be marked with the grade and trademark using the recognized association marks. If shipment is accompanied by association certificate of inspection, grade and trade marks on

each piece of bundle will not be required.

4. Stack framing lumber to insure proper ventilation and drainage. Protect lumber from the elements. Protect millwork against dampness during and after delivery. Store under cover in a well-ventilated building and where not exposed to extreme changes of temperature or humidity. Do not store or install millwork in any part of the building until concrete, masonry and plaster work are dry.
- B. ALL JOISTS, PLATES, STUDS, PLANKS, and other framing members shall be construction grade or better.
- C. PINE used for ground, furring, nailing strips, and blocks shall be kiln dried No.3 and better, common white Ponderosa pine.
- D. FIR PLYWOOD PANEL FOR INTERIOR USE is to be Grade AD, and of the ply and thickness noted on the Drawings or specified herein.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. ALL ROUGH CARPENTRY WORK shall be installed in accordance with the best practices of the trade by skilled workmen.
- B. FURNISH AND INSTALL ALL GROUNDS required in connection with Carpentry and Millwork. These shall be set level, true, and plumb, and properly placed to receive and engage materials.

END OF SECTION

Lehi Maintenance Building

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

This Section includes, but is not limited to, the furnishing of all labor and materials to install wood base and the hanging of all doors and installation of finish hardware. Painted wood base shall be installed in the office, break room, bathroom areas on the main floor and where gyp. bd. walls occur in the shop.

B. Related work described elsewhere:

1. Section 06100 - Rough Carpentry
2. Section 08110 - Hollow Metal Doors & Pressed Metal Door Frames
3. Section 08700 - Finish Hardware
4. Section 09250 - Gypsum Drywall Systems

C. The following items will be by others:

1. Furnishing, installing, and connecting of sinks, electrical outlets, and casework, or along backs of working surfaces as required for utility service fittings.
2. Installing all utility service outlet accessory fittings furnished by the casework contractor, pulling of wire, and connecting of electrical fittings in service lines.
3. Furnishing, installing, and connecting all special plumbing fittings and piping to meet local codes.
4. Furnishing and installing of all framing, bucks, metal grounds, or reinforcements for walls, floor, and ceilings to adequately support the casework or brick and plaster grounds for proper anchoring of the equipment.
5. Furnishing fluorescent tubes, light bulbs and any other miscellaneous materials generally classified as maintenance or supply items.
6. General Contractor shall be responsible for protection and security after the finish carpenter contractor completes his portion of the Work.

1.2 QUALITY CONTROL

Only skilled craftsmen, totally experienced with all phases of this work, shall be used to construct the work in this Section.

1.3 SAMPLES AND SHOP DRAWINGS

*S All Contractors, upon request, shall be required to SUBMIT SAMPLES made in accordance

Lehi Maintenance Building

with this Specification. These shall be delivered at no cost to the Architect or Owner, to a destination set forth by the Architect or Owner. Samples shall be full size and must illustrate construction, hardware, materials and finish. SUBMIT SHOP DRAWINGS in accordance with the General Conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. PINE shall be select Grade "B" or better, White Ponderosa Pine which is thoroughly kiln-dried, and having an average moisture content of ten percent
 1. Color to be selected by Architect, or as shown on the Room Finish Schedule. (10%) or less by weight.

2.2 STANDARD OF QUALITY

The Working Drawings show the intent of the finished carpentry construction; however, all detailed requirements by the manufacturers shall be approved by the Architect. Reasonable variations as approved by the Architect will be satisfactory. Submit complete data.

PART 3 - EXECUTION

3.1 ASSEMBLY AND WORKMANSHIP

- A. The general quality of work shall be as follows:
 1. All finish carpentry shall be planed, cut, rabbeted, grooved, fitted, etc., as necessary for proper assembly and accurate working to details. Built-up members shall be glued, splined, doweled, tongue-and-grooved, full- or half-housed, or rabbeted together as detailed or as necessary for firm and sound construction. Should nails or screws be required in the assembly process, they are to be concealed.
 2. All members thicker than one and five-eighths inch (1-5/8") shall be laminated of not thicker than one and five-eighths inch (1-5/8") pieces. All laminated members shall be glued.
 3. All surfaces which are to be placed directly or indirectly in contact with masonry or other wall surfaces shall be back primed.
 4. All surfaces of millwork which are to receive Painter's finish are to be mill sanded on all exposed surfaces to a smooth even plane. Care shall be exercised in assembling pieces where the grain is perpendicular in various places, one to another, and in panels, to avoid cross sanding.
 5. The Contractor shall fabricate all work in accordance with measurements taken at the job, conforming it to job conditions. Where scribing or cutting appears necessary, the materials shall be made in ample size to allow for job adjustments.

Lehi Maintenance Building

- B. ALL TRIM MEMBERS, INCLUDING WOOD BASE where noted, shall be true to details, cleanly cut, and sharp. Scribing, mitering, and joining shall be done accurately and neatly to conform to the details as required. Intersecting molds at re-entrant corners shall be neatly coped rather than mitered where such is possible. All trim wider than three inches (3") shall be routed on the back surface. Shop joints shall be made under pressure with waterproof or hot glue.

END OF SECTION

Lehi Maintenance Building

SECTION 07200 - BUILDING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included

Provide and install all building insulation as shown on the drawings. Building insulation includes but is not limited to foundation insulation, faced batt insulation, blown fiberglass insulation and sound batt insulation in interior walls.

B. Related Work Specified Elsewhere

1. Section 03300 - Poured In Place Concrete
2. Section 06100 - Rough Carpentry
3. Section 07100 - Membrane Waterproofing and Dampproofing
4. Section 09250 - Light Gage Metal Framing
5. Section 16000 - Electrical

1.2 PRODUCT DELIVERY, STORAGE & HANDLING

A. Protection

1. Deliver all materials in unbroken cartons, free from visible exterior damage and store in a dry place.
2. Handle all materials to protect against breaks, tears, etc, before, during, and after installation.
3. Store materials flat to prevent insulation edge damage.

B. Replacements

In the event of damage, replace the insulation and remove damaged material from the site.

PART 2 - PRODUCTS

2.1 WALL CEILING INSULATION

A. Batt Insulation

Fiberglass batt insulation shall be four-inch (4") R-13 and (6") R-19, R-38 faced and unfaced batts as manufactured by Johns Manville , or equal by Owens-Corning Fiberglas Corp. Certainteed, Knauf. Insulation shall have a flame spread of 0-25.

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- C. Metal Building Wall and Ceiling Insulation:
Continuous Fiberglass insulation shall be R-19 walls and R-30 ceiling, as manufactured Johns Manville (Microlite L with Lamtec (or equal) WMP-50 Polypropylene vapor retarded facing) or equal by Owens-Corning Fiberglas Corp. Certainteed, Knauf.
- D. Foundation Insulation:
Furnish and install 2 " rigid Styrofoam square edge rigid foundation insulation as shown on the construction documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install rigid styrofoam insulation on foundation wall from footing to bottom of slab as shown. Thickness shall be as shown on the Drawings. Styrofoam shall be continuous throughout, fitting tightly against the bottom of slab-on-grade. Use stick clips and Dow Mastic #11 to attach to concrete wall surface.
- B. Installer shall place insulation in ALL AREAS NECESSARY to complete the total insulation envelope of the building.
- C. BATT INSULATION shall be installed complete, with no gaps, holes, or tears in vapor barrier. Use taping when required to hold tightly together.
- D. In walls, all cavities shall be snug fit to stud spaces and secured. All other voids shall be filled tightly.

END OF SECTION

SECTION 07901 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes joint sealants for the following locations:
 - 1. Exterior joints in vertical surfaces as indicated below:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Perimeter of door, window and mechanical openings.
 - 2. Exterior joints in horizontal traffic surfaces as indicated below:
 - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 3. Interior joints in vertical surfaces and horizontal non traffic surfaces as indicated below:
 - a. Perimeter joints of exterior openings where indicated.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - c. Other joints as indicated.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 8 "Glazing" for sealants used in glazing.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data from manufacturers for each joint sealant product required.
- C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

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- D. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.
- E. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.
- F. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- G. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.
- H. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
- B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
 - 2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealants to occur not less than 21 or more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
 - 1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.
 - 1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant Data Sheet, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.
- B. Available Products: Subject to compliance with requirements, elastomeric sealants that may be incorporated in the Work include, but are not limited to, the products specified in each Elastomeric Sealant Data Sheet.

2.3 LATEX JOINT SEALANTS

- A. General: Provide manufacturer's standard one-part, nonsag, mildew-resistant, paintable latex sealant of formulation indicated that is recommended for exposed applications on interior and protected exterior locations and that accommodates indicated percentage change in joint width existing at time of installation without failing either adhesively or cohesively.

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- B. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.
- C. Available Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Acrylic-Emulsion Sealant:
 - a. "AC-20," Pecora Corp.
 - b. "Sonolac," Sonneborn Building Products Div., ChemRex, Inc.
 - c. "Tremco Acrylic Latex 834," Tremco, Inc.

2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Open-cell polyurethane foam.

2.5 JOINT FILLERS FOR CONCRETE PAVING

- A. General: Provide joint fillers of thickness and widths indicated.
- B. Bituminous Fiber Joint Filler: Performed strips of composition below, complying with ASTM D 1751:
 - 1. Asphalt saturated fiberboard.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form release agents from concrete.
 - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

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ELASTOMERIC JOINT SEALANT DATA SHEET

Elastomeric Joint Sealant Designation: ES-1

Base Polymer: Urethane.

Type: S (single component).

Grade: P (pourable).

Class: 25.

Use Related to Exposure: T (traffic).

Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated.

Use O Joint Substrates: Galvanized steel, brick, concrete, ceramic tile, and wood.

Available Products: "NR-201 Urexpam," Pecora Corp.; "Vulkem 45," Mameco; "Sonolastic SL 1," Sonneborn Building Products Division.

ELASTOMERIC JOINT SEALANT DATA SHEET

Elastomeric Joint Sealant Designation: ES-2

Base Polymer: Urethane silicone.

Type: M (multi component).

Grade: NS (nonsag).

Class: 25.

Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.

Use Related to Exposure: NT (nontraffic).

Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

Use O Joint Substrates: Coated glass, color anodized aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, ceramic tile, and wood.

Available Products: "Dynatrol II," Pecora Corp.; "Vulkem 922," Mameco; Sonolastic NP2," Sonneborn Building Products Division.

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ELASTOMERIC JOINT SEALANT DATA SHEET

Elastomeric Joint Sealant Designation: ES-3

Base Polymer: Acid-curing silicone.

Type: S (single component).

Grade: NS (nonsag).

Class: 25.

Use Related to Exposure: NT (nontraffic).

Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.

Use O Joint Substrates: Coated glass, color anodized aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, and ceramic tile.

Available Products: "786 Mildew Resistant," Dow Corning; "Sanitary 1700," GE Silicones.

JOINT SEALANT SCHEDULE		
SEALANT DESIGNATIONS	JOINT SEALERS	DESCRIPTION OF JOINT CONSTRUCTION AND LOCATION WHERE SEALANT IS TYPICALLY APPLIED*.
ES1	One-Part Pourable Urethane Sealant	Exterior and interior joints in horizontal surfaces of concrete; between metal and concrete, mortar and masonry.
ES2	Multi-Part Nonsag Urethane Sealant	Exterior and interior joints in vertical surfaces of concrete and masonry; between metal and concrete or mortar; interior and exterior perimeter joints of metal frames in exterior walls; exterior overhead joints.
ES3	One-Part Mildew-Resistant Silicone Sealant	Interior joints in vertical surfaces of ceramic tile in toilet rooms, and perimeter of plumbing fixture/ceramic tile joints.

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LS	Acrylic-Emulsion Sealant	Interior joints in field-painted vertical and overhead surfaces at perimeter of hollow metal door frames; in gypsum drywall, plaster, concrete, and concrete masonry; and all other interior joints not indicated otherwise.
* Install sealant indicated in joints fitting descriptions listed.		

END OF SECTION 07901

SECTION 08111 – STANDARD STEEL DOORS AND FRAMES

PART 1- GENERAL

1.1 SECTION REQUIREMENTS

- A. Submit Product Data and door schedule.
- B. Comply with ANSI/SDI 100.

PART 2- PRODUCTS

2.1 MATERIALS

- A. Hot-Rolled Steel Sheets: ASTM A 569 (ASTM A 569M).
- B. Cold-Rolled Steel Sheets: ASTM A 366 (ASTM A 366M), commercial quality or ASTM A 620 (ASTM A 620M), drawing quality.
- C. Galvanized Steel Sheets: ASTM A 653 (ASTM A 653M), commercial quality or ASTM A 642 (ASTM A 642M), drawing quality, with A60 or G60 (ZF180 or Z180) coating designation, mill phosphatized. (exterior doors)

2.2 STEEL DOORS AND FRAMES

- A. Steel Doors: 1-3/4-inch thick of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:
- B. Doors: Grade III, extra heavy-duty, Model 4, minimum 16 gauge galvanized steel sheet faces. All doors shall have fully bonded polystyrene cores.
- C. Fabricate steel frames to be rigid, neat in appearance, and free from defects, warp, or buckle.
 - 1. For exterior frames, provide units with mitered or coped and continuously welded corners, formed from 14 gauge galvanized steel.
 - 2. Prepare doors and frames to receive mortised and concealed hardware according to SDI 107.
- D. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying finishes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Place steel frames to comply with provisions of SDI 105.
- B. Install steel doors accurately in frames, within clearances specified in ANSI/SDI 100.

END OF SECTION 08111

SECTION 08360 – SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. The work of this Section includes the furnishing and complete installation of upward-acting sectional doors. Scope of work shall include, but is not limited to, upward-acting sectional doors, miscellaneous metal, metal framing and supports, finish hardware, key cylinders for locks, painting, field painting, and electrical wiring.
- B. Submit Product Data.
- C. Installer: Installation of sectional doors shall be performed by the authorized representative of the manufacturer.
- D. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.
- E. Design and reinforce sectional overhead doors to withstand a 20-lbf/sq. ft. wind-loading pressure.
- F. Design overhead coiling door components and operator to operate for not less than 100,000 cycles.

1.2 WARRANTY

- A. Provide warranty on door components as follows:
 - 1. Doors - One year parts and labor; ten year rust through
 - 2. Warranty shall cover all costs of covered repairs, parts, labor and travel expenses.

PART 2 - PRODUCTS

2.1 SECTIONAL OVERHEAD DOORS

- A. Sectional Door Assembly
 - 1. Metal/foam/metal sandwich panel construction, with EPDM thermal break and ship-lap design with rounded water channels. Units shall have the following characteristics:
 - a. Panel Thickness: 2".
 - b. Exterior Surface: Ribbed, textured.
 - c. Exterior Steel: 0.016", hot-dipped galvanized.
 - d. End Stiles: 16 gauge with thermal break.
 - e. Heavy Duty Springs; 100,000 cycles.
 - f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
 - g. Thermal Values: R-value of 17.50; U-value of 0.057.

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- h. Air Infiltration: 0.08 cfm at 15 mph; 0.13 cfm at 25 mph.
 - i. High-Usage Package: Required.
- B. Full Glazing of Steel Panels: Insulated double strength glass.
- C. Finish and Color: Two coat baked-on polyester with white exterior and interior color.
- D. Windload Design: Design and reinforce doors to withstand a 20 psf wind-loading pressure. Deflection of the door in the horizontal position will not exceed 1/120 of the door width. Meet ANSI/NAGDM 102 standards.
- E. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- F. Lock: Interior mounted slide lock.
- G. Weatherstripping: EPDM rubber tube seals fitted inside joints between sections. EPDM rubber bulb-type strip at bottom. (Header seal and jamb weatherstripping.)
- H. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
- I. Door Operator Type: Provide center mounted jack shaft operator with solenoid activated primary drive and, chain and sprocket secondary drive at the side of the door.
- J. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Provide solenoid brakes.
- K. Entrapment Protection: Electric sensing edge.
- L. Operation Controls: Push-button operated control stations with open, close, and stop buttons for surface mounting, for interior location.
- M. Remote Control: Heavy duty transmitter with rocker switch. Provide one per door.
- N. Provide disengaging auxiliary chain hoist. Hoist chain must run only when hoist is engaged.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Take field dimension and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Correct any unsatisfactory conditions before proceeding with door installation.

3.2 INSTALLATION

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- A. Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- B. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.3 ADJUSTING AND CLEANING

- A. Test sectional doors for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Touch-up damaged coatings and finishes, and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

END OF SECTION 08360

SECTION 08521 - VINYL (PVC) WINDOWS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Furnish and install thermally-broken, fixed windows complete with related components as shown in the attached drawings and as specified in this section. All units are to be factory glazed.

1.2 REFERENCES

- A. AAMA/NWWDA 101/I.S. 2-97 - Voluntary Standard for Aluminum and Poly (Vinyl Chloride) (PVC) Prime Windows and Glass Doors.
- B. NFRC 100 - Thermal Properties; National Fenestration Rating Council.
- C. NFRC 200 - Solar Heat Gain; National Fenestration Rating Council.
ASTM D 3656 - Standard Specification for Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Fiber Yarn.
- D. ASTM D 3678 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Interior Profile Extrusions.
- E. ASTM D 4028 - Standard Specification for Solar Screening Woven from Vinyl-Coated Fiber Glass Yarn.
- F. ASTM E 774 - Standard Specification for Sealed Insulating Glass.
- G. IGCC - Classification of Insulating Glass Units; Insulated Glass Certification Council.
- H. U.S. Department of Energy - Energy Star(R) Windows Program.

1.3 SUBMITTALS

- A. Submit product data.
- B. Product Data: Manufacturer's standard details and catalog data demonstrating compliance with referenced standards; include manufacturer's standard installation instructions.
- C. Drawings: Manufacturer's product drawings showing details of fabrication, hardware, weatherstripping, fasteners, screens, glazing, accessories, and related items.
- D. Test Reports: For each window type specified, furnish test reports from accredited independent testing laboratory certifying that identical or larger window units meet requirements specified for air infiltration, water penetration and structural performance by AAMA/NWWDA 101/I.S. 2-97, for thermal performance by NFRC-97, and for seal integrity of insulating glass units by IGCC.
- E. Test reports to test standards other than those listed will not be accepted.

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- F. Closeout Submittals: Warranty documents, properly executed.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum ten (10) years experience producing vinyl (PVC) windows.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver windows to project site in undamaged condition; handle windows to prevent damage to components and to finishes.
- B. Store windows out of contact with ground; protect windows from weather and construction traffic in well-ventilated area.

1.6 WARRANTY

- A. Furnish manufacturer's standard warranty against deficiencies in materials or fabrication.

2.1 PRODUCTS

A. ACCEPTABLE MANUFACTURERS

1. Alside Window Systems
2. Kolbe & Kolbe Latitude Series
3. Milgard Windows
4. Jones Paint and Glass Sentry Plus

B. PRODUCT REQUIREMENTS

1. Grade: AAMA/NWWDA 101/I.S. 2-97, HS-LC30, for 72-inch wide by 54-inch high window unit; exceeding grade requirements as follows:
 - a. Water test pressure: 6.75 pounds per square foot.
 - b. Air infiltration: 0.10 cubic feet per minute per linear foot at 25 miles per hour.
 - c. Structural Test Pressure: 60 pounds per square foot
 - d. Thermal performance, in accordance with NFRC 100-97, for 72-inch wide by 48-inch high window unit: U-Value 0.32.
 - e. ~~Solar Heat Gain Coefficient, in accordance with NFRC 200-97, for 60-inch wide by 36-inch high window unit shall not exceed 0.32.~~
 - f. ~~Glazing: Low-e sealed insulating glass unit, 13/16 inch unit thickness, with DSB glass and argon gas fill; U.S. Department of Energy Energy Star(R) conformance labeled.~~
 - g. Sealed Insulating Glass Units: Conform to ASTM E 774, Level CBA.

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2. Frame: PVC extrusions, butt-joint construction at corners, joined with screws into integral screw ports; multi-chambered weep system with wind-blocking covers.

C. FABRICATION

1. Window Units: Assemble units completely in factory, including glazing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Openings are in correct location, and of correct size, in accordance with approved shop drawings and manufacturer's installation instructions.
- B. Installer's Examination:
 1. Have installer of this section examine conditions under which construction activities of this section are to be performed, then submit written notification if such conditions are unacceptable.
 2. Transmit two copies of installer's report to Owner within 24 hours of receipt.
 3. Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.
 4. Beginning construction activities of this section indicates installer's acceptance of conditions.

C. INSTALLATION

1. Install products specified in this section square, plumb and level, in accordance with approved shop drawings and manufacturer's installation instructions.
2. Install joint sealers as specified.

D. CLEANING

1. Clean interior and exterior surfaces free of labels, mortar, plaster, paint, joint sealers, and other foreign matter to prevent damage to weatherstrip, and to prevent interference with operation of hardware.

E. PROTECTION

1. Protect ventilators and operating parts from dirt and damage caused by subsequent construction activities.
2. Replace units damaged by subsequent construction activities.

END OF SECTION 08521

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SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submit Product Data.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Manufacturer's Product Designations

1. The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated or a comparable product from another manufacturer.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Mount hardware in locations recommended by the Door and Hardware Institute, unless otherwise indicated.
- B. Keying: Review the keying system with the Owner and provide the type required. Equip locks with cylinders for interchangeable-core pin tumbler inserts (Best only). Furnish only temporary inserts for the construction period and remove these when directed. Contractor to include in bid to provide to Owner replacement permanent cores and keys. Deliver cores and keys to Owner. Provide 3 keys for each lock. Keys to be stamped "DO NOT DUPLICATE".

3.2 HARDWARE SCHEDULE

- A. General: Provide hardware for each door to comply with requirements of Section "Door Hardware," hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.
 1. Hardware sets indicate quantity, item, manufacturer and product designation, size and finish or color, as applicable.
 2. Provide hardware with US26D finish, unless indicated otherwise.
 3. Lockset Designs: Provide the lockset designs designated in the Hardware Schedule or, if by another manufacturer, one that matches those designated:
 4. Provide locks with interchangeable cores per requirements of this section.

3.3 Hardware Schedule

- A. Hardware Group 1

11/2 pair hinges	Stanley	FBB199 4.5 x 4.5 NRP	US26D
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1 lock	Best	93K-7AB14CSTK	US26D
1 closer	LCN	4041	ALUM
1 kickplate	Quality	8 x 1.5 LDW	US26D
1 stop	Quality	119ES	US26D
1 threshold	Pemko	169A	ALUM
1 door sweep	Pemko	315 CN	ALUM
1 weatherstrip	Pemko	303AV	ALUM

B. Hardware Group 2

1 1/2 pair hinges	Stanley	FBB199 4.5 x 4.5 NRP	US26D
1 lock	Best	93K-7AB14CSTK	US26D
1 kickplate	Quality	8 x 1.5 LDW	US26D
1 stop	Quality	119ES	US26D
3 silencers	Rockwood	608	GREY

C. Hardware Group 3

1 1/2 pair hinges	Stanley	FBB199 4.5 x 4.5 NRP	US26D
1 privacy	Best	93K-7114CSTK	US26D
1 stop	Quality	119ES	US26D
3 silencers	Rockwood	608	GREY

D. Hardware Group 4

3 pair hinges	Stanley	FBB199 4.5 x 4.5 NRP	US26D
1 lock	Best	93K-0N14CSTK	US26D
2 kickplate	Quality	8 x 1.5 LDW	US26D
2 stop	Quality	119ES	US26D
2 automatic flushbolts	Rockwood	1842	US26D

END OF SECTION 08710

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Comply with written instructions of glass product manufacturers; FGMA's "Glazing Manual"; and publications of AAMA, LSGA, and SIGMA as applicable to products indicated, unless more stringent requirements are indicated.
- B. Insulating-Glass Units: Permanently mark with appropriate certification label of one of the inspecting and testing agencies indicated below:
 - 1. Insulating Glass Certification Council (IGCC).
 - 2. Associated Laboratories, Inc. (ALI).
 - 3. National Certified Testing Laboratories (NCTL).

1.2 SUBMITTALS

- A. Submit Product Data and Samples.

PART 2 - PRODUCTS

2.1 GLASS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class as indicated in schedule, and Quality q3.
- B. Heat-Treated Float Glass:
 - 1. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I, (transparent glass, flat), Class 1 (clear), Quality q3, Kind as indicated.
 - 2. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I, (transparent glass, flat), Class 2 (tinted heat-absorbing and light reducing), Quality q3, with tint color and performance characteristics for 6.0 mm (0.23-inch thick) glass matching those indicated for annealed primary tinted float glass, Kind as indicated.

2.2 FABRICATED GLASS PRODUCTS

- A. Sealed Insulating-Glass Units: Preassembled units consisting of organically sealed lites of glass separated by dehydrated air spaces complying with ASTM E 774 and with other requirements indicated, including those in the Insulating Glass Product Data Sheets at the end of this Section.

PART 3 - EXECUTION

3.1 INSTALLATION

Lehi Maintenance Building

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are contained in FGMA's "Glazing Manual."
- B. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.2 GLAZING SCHEDULE

<u>Glass Designation</u>	<u>Nominal Thickness</u>	<u>Description</u>
IG-1	3/4"	Insulating glass consisting of clear float glass, indoor lite and tinted, float glass outdoor lite, with 1/2" air space at all exterior framed windows.
IG-2	3/4"	Insulating glass consisting of clear tempered glass, indoor lite and tinted, tempered glass outdoor lite, with 1/2" air space at all exterior man doors.

INSULATING GLASS PRODUCT DATA SHEETS

Insulating Glass Unit Designation: IG-1

Classification of Units: Class CBA per ASTM E 774

Air Space Width: Nominal 1/2 inch measured perpendicularly from surfaces of glass lites at unit's edge.

Gas Filling: Argon

Sealing System: Dual seal, primary and secondary sealants; manufacturer's standard sealants.
Spacer Specifications: Manufacturer's standard metal.

Dessicant: Either molecular sieve or silica gel or blend of both.

Corner Construction: Manufacturer's standard corner construction.

Color of Spacer: Color as selected by Owner from Manufacturer's standard colors.

Glass Specifications: Comply with the following requirements:

Thickness of each lite: (0.125 inch)

Uncoated Indoor Lite: Class 1 (clear) float glass

Lehi Maintenance Building

Uncoated Outdoor Lite: Class 1 (clear) float glass, Kind HS (heat strengthened).

Nominal Performance Characteristics are as indicated below:

Summer Daytime U-Value: 0.57
Winter Nighttime U-Value: 0.49
Shading Coefficient: 0.58

Insulating Glass Unit Designation: IG-2

Classification of Units: Class CBA per ASTM E 774

Air Space Width: Nominal ½ inch measured perpendicularly from surfaces of glass lites at unit's edge.

Gas Filling: Argon

Sealing System: Dual seal, primary and secondary sealants; manufacturer's standard sealants.

Spacer Specifications: Manufacturer's standard metal.

Dessicant: Either molecular sieve or silica gel or blend of both.

Corner Construction: Manufacturer's standard corner construction.

Color of Spacer: Color as selected by Owner from Manufacturer's standard colors.

Glass Specifications: Comply with the following requirements:

Thickness of each lite: (0.125 inch)

Uncoated Indoor Lite: Kind FT (fully tempered), Condition A (uncoated), Class 1 (clear) float glass

Uncoated Outdoor Lite: Kind FT (fully tempered), Condition A (uncoated), Class 1 (clear) float glass.

END OF SECTION 08800

Lehi Maintenance Building

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. This section includes surface preparation and painting as described.
- B. Painting includes field-painting of all exposed surfaces, including but not limited to; man doors and frames and pipe bollards.

1.2 RELATED SECTIONS

- A. SECTION 03054 – OLIOPHOBIC SEALER

1.3 SUBMITTALS

- A. Submit Product Data.

PART 2 - PRODUCTS

2.1 General

- A. Provide manufacturer's recommended primers/sealers, bond coat materials, finish coat materials and related materials that are compatible with one another and the substrates indicated.
- B. Primers
 - 1. Provide the manufacturer's recommended factory-formulated primers that are compatible with the substrate and finish coats indicated.
- C. Exterior Finish Paint Schedule
 - 1. Ferrous Metal (Primer not required on shop-primed items: Two finish coats, full gloss alkyd enamel over synthetic rust-inhibiting primer, 2.5 mils minimum total dry film thickness.
 - 2. Zinc-coated Metal: Two finish coats, Alkyd Gloss Enamel, Weather-resistant, air-drying high gloss enamel over galvanized metal primer, 2.5 mils minimum total dry film thickness.
- D. Interior Finish Paint Schedule
 - 1. Gypsum Board Panels: Two finish coats, Interior, semigloss, odorless Alkyd Enamel over white, interior, latex-based primer, 2.5 mils minimum total dry film thickness.
 - 2. Ferrous Metal: Two finish coats, Exterior, gloss, Alkyd Enamel, over synthetic, quick-drying, rust-inhibiting primer, 2.5 mils minimum total dry film thickness.
 - 3. Zinc-coated Metal: Two finish coats, Exterior, gloss, Alkyd Enamel over galvanized metal primer, 2.5 mils minimum total dry film thickness.

Lehi Maintenance Building

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before applying coatings or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Clean and prepare surfaces to be coated according to the manufacturer's instructions for each particular substrate condition.

3.2 APPLICATION

- A. Apply according manufacturer's recommendation.

END OF SECTION 09900

SECTION 10522 - FIRE EXTINGUISHERS AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Provide fire extinguishers approved and listed with UL or FM, and bearing UL or FM markings, for the type, rating, and classification of extinguisher.

1.2 SUBMITTALS

- A. Submit Product Data.

2.1 PRODUCTS

A. FIRE EXTINGUISHERS

1. Fire Extinguishers: Multipurpose dry-chemical type, with UL rating of 2-A:10B:C, 5-lb. nominal capacity in enameled steel container.
2. Provide 3 extinguishers. Locate one in office area, and 2 in shop..
3. Provide wall mounting bracket.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide a mounting bracket for each fire extinguisher.
- B. Install brackets at heights indicated or, if not indicated, at heights to comply with applicable regulations of authorities having jurisdiction.
- C. Identify bracket-mounted extinguishers with "FIRE EXTINGUISHER" in red letter decals applied to wall surface. Letter size, style, and location as selected by Owner.

END OF SECTION 10522

SECTION 13125 - METAL BUILDING SYSTEMS

PART I - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Structural framing.
- 2. Roof panels.
- 3. Wall panels.
- 4. Fascia and soffit panels.
- 5. Building components, as follows: provide and install misc. framing for mechanical units and grills, framing for lighting support, overhead door frames, doors, windows, equipment and other items not listed which will rely on the building for support.
- 6. Accessories and trim.
- 7. 8' interior painted metal wall panels in shop area. (panel to match exterior panels)

- B. Related Sections include the following:

- 1. Division 3 Section "Cast-in-Place Concrete" for concrete foundations and anchor-bolt installation including concrete waterproofing systems.
- 2. Division 16 Section "Interior Exterior Building Lighting" for required coordination of equipment with wall, and soffit.

1.3 DEFINITIONS

- A. Bay Spacing: Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured perpendicular to end wall (outside face of end-wall girt).
- B. Building Length: Dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of girt to outside face of girt).
- C. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).
- D. Clear Span: Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame, or knee).
- E. Eave Height: Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).
- F. Clear Height under Structure: Vertical dimension from finished floor to lowest point of any part of primary or secondary structure, not including crane supports, located within

clear span.

- G. Terminology Standard: Refer to MBMA's "Low Rise Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, roof and wall panels, and accessories complying with requirements indicated, including those in this Article.
- B. Metal Building System Design: Of size, spacing, slope, and spans indicated, and as follows:
 - 1. Primary Frame Type: Provide the following: Rigid Clear Span: Solid-member structural-framing system.
 - a. Exterior columns shall be straight or tapered type.
 - b. Rafters shall be straight or tapered type.
 - 2. End-Wall Framing: Manufacturer's standard, for buildings required to be non-expandable as follows:
 - a. Provide primary frame, capable of supporting one-half of a bay design load, and end-wall columns.
 - b. Flush-framed girts.
 - 3. Eave Height: Manufacturer's standard height, as indicated by nominal height on Drawings.
 - 4. Bay Spacing: See plans.
 - 5. Roof Slope: 1 inch per 12 inches (See plans).
 - 6. Roof System: Manufacturer's standard standing-seam roof panels with high clip.
 - 7. Exterior Wall System: Manufacturer's standard field-assembled insulated wall panels.
- C. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Engineer metal building systems according to procedures in MBMA's "Low Rise Building Systems Manual."
 - 2. Design Loads: As indicated in Supplementary General Conditions.
 - 3. Live Loads: Include vertical loads induced by the building occupancy indicated on Drawings. Include loads induced by maintenance workers, materials, and equipment for roof live loads. Building Occupancy: As indicated.
 - 4. Roof Snow Loads: Include vertical loads induced by the weight of snow as indicated. Allow for unbalanced and drift loads.
 - 5. Wind Loads: Include horizontal loads induced by an ultimate wind speed corresponding IBC 115 mph, Exposure C, Wind Importance Factor 1.0.

Lehi Maintenance Building

6. Collateral Loads: Include additional dead loads other than the weight of metal building system for permanent items such as sprinklers, mechanical systems, electrical systems, and ceilings.
 7. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations.
 8. Deflection Limits: Engineer assemblies to withstand design loads with deflections no greater than the following:
 - a. Purlins and Rafters: Vertical deflection of $1/240$ of the span.
 - b. Girts: Horizontal deflection of $1/180$ of the span.
 - c. Roof Panels: Vertical deflection of $1/180$ of the span.
 - d. Wall Panels: Horizontal deflection of $1/180$ of the span.
 9. Design secondary framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.
- D. Seismic Performance: Design and engineer metal building systems capable of withstanding the effects of earthquake motions determined according to the International Building Code.
- E. Thermal Movements: Provide metal building roof and wall panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. Air Infiltration for Roof Panels: Provide roof panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. of fixed roof area when tested according to ASTM E 1680 at a static-air-pressure difference of 4 lbf/sq. ft.
- G. Air Infiltration for Wall and Soffit Panels: Provide wall panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 4 lbf/sq. ft.
- H. Water Penetration for Roof Panels: Provide roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 24 lbf/sq. ft.
- I. Water Penetration for Wall and Soffit Panels: Provide wall panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.
- J. Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for the following wind-uplift resistance:

1. Class 90. With additional requirements for resistance to 115 mph winds.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes and available colors as indicated on the drawings for each type of the following metal building system components:
 1. Structural-framing system.
 2. Roof panels.
 3. Wall panels.
 4. Vapor retarders.
 5. Trim and closures.
 6. Accessories.
 7. Mechanical louvers.
 8. Mechanical roof penetrations.
- B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other Work.
 1. For installed components indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Anchor-Bolt Plans: Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
 3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 4. Roof and Wall Panel Layout Drawings: Show layouts of panels on support framing, details of edge conditions, joints, panel profiles, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work.
 5. Accessory Drawings: Include details of the following items, at a scale of not less than 2 inches per 12 inches: Include details of reinforcement and installation requirements for all accessories specified in other sections.
 - a. Ventilators. Coordinate with mechanical.
 - b. Louvers. Coordinate with mechanical.
 - c. Lighting.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of the following products with factory-applied color finishes as required to match the selected colors: Design intent is to match the colors of the existing open storage building on-site; roof, walls and trim & closure colors as used on existing building.
 1. Roof panels.
 2. Wall panels.

Lehi Maintenance Building

3. Soffit panels.
 4. Trim, gutter and closures.
 5. Accessories.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected, in the profile and style indicated. Prepare Samples from the same material to be used for the Work.
1. Roof Panels: 12-inches long by actual panel width (24"). Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
 2. Architectural Wall Panels: 12-inches long by actual panel width (36"). Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
 3. Soffit Panels: 12-inches long by actual panel width (12"). Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.
 4. Trim and Closures: 12-inches long. Include fasteners and other exposed accessories.
 5. Vapor Retarders: 6-inch square samples.
 6. Accessories: 12-inch long samples for each type of accessory.
- E. Product Certificates: Signed by manufacturers of metal building systems certifying that products furnished comply with requirements.
1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
 - a. Name and location of Project.
 - b. Order number.
 - c. Name of manufacturer.
 - d. Name of Contractor.
 - e. Building dimensions, including width, length, height, and roof slope.
 - f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - g. Governing building code and year of edition.
 - h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic zone or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
 - i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 - j. Building-Use Category: Indicate category of building use and its effect on load importance factors.
 - k. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
- F. Welding Certificates: Copies of certificates for welding procedures and personnel.
- G. Erector Certificates: Signed by manufacturer certifying that erectors comply with requirements.
- H. Manufacturer Certificates: Signed by manufacturers certifying that they comply with

requirements. Include evidence of manufacturing experience.

- I. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- J. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating the following current products comply with requirements:
 - 1. Insulation and Vapor Retarders: Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- K. Surveys: Show final elevations and locations of major members. Engage a qualified engineer or land surveyor to perform surveys and certify their accuracy. Indicate discrepancies between actual installation and the Contract Documents.
- L. Warranties: Special warranties specified in the provisions of the contract documents.

1.6 QUALITY ASSURANCE

- A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal building systems that are similar to those indicated for this Project in material, design, and extent.
- C. Manufacturer Qualifications: A firm experienced in manufacturing metal building systems similar to those indicated for this Project and with a record of successful in-service performance.
 - 1. Member of MBMA.
 - 2. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components, AISC-Certified Facility, Category I.
 - 3. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.
- D. Surveyor Qualifications: A land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.
- E. Source Limitations: Obtain each type of metal building system component through one source from a single manufacturer.

- F. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Owner, except with Owner's approval. If modifications are proposed, submit comprehensive explanatory data to Owner for review.
- G. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.3, "Structural Welding Code--Sheet Steel." All welding shall be done by certified welders per AWS in the last 12 months.
- H. Regulatory Requirements: Fabricate and label structural framing to comply with special inspection requirements at point of fabrication for welding and other connections required by authorities having jurisdiction.
- I. Structural Steel: Comply with AISC S335, "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design"; or AISC S342, "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- J. Cold-Formed Steel: Comply with AISI SG-671, "Specification for the Design of Cold-Formed Steel Structural Members," and AISI SG-911, "Load and Resistance Facet Design Specification for Steel Structural Members," for design requirements and allowable stresses.
- K. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to metal building systems including, but not limited to, the following:
 - 1. Inspect and discuss condition of foundations and other preparatory work performed by other trades.
 - 2. Review structural load limitations.
 - 3. Review and finalize construction schedule and verify availability of materials, Erector's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review required testing, inspecting, and certifying procedures.
 - 5. Review weather and forecasted weather conditions and procedures for unfavorable conditions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package roof and wall panels for protection during transportation and handling.

Lehi Maintenance Building

- B. Handling: Unload, store, and erect roof and wall panels to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store roof and wall panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit roof and wall panel installation to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Verify metal building system foundations by field measurements before metal building fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Established Dimensions for Foundations: Where field measurements cannot be made without delaying the Work, establish foundation dimensions and proceed with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
 - 2. Established Dimensions for Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating roof and wall panels without field measurements, or allow for field-trimming panels. Coordinate roof and wall construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 COORDINATION

- A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and form work requirements are specified in Division 3 Section "Cast-in-Place Concrete."
- B. Coordinate installation of roof curbs, equipment supports, roof, wall and soffit penetrations.

1.10 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty on Panels: Written warranty, executed by manufacturer agreeing to repair or replace roof and wall panels that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.
- C. Special Warranty on Panel Finishes: Written warranty, signed by manufacturer agreeing to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.
1. Warranty Period for Roof Panels: 20 years from date of Substantial Completion.
 2. Warranty Period for Wall Panels: 20 years from date of Substantial Completion.
- D. Special Warranty on Standing-Seam Roof Panel Weather tightness: Written warranty, signed by manufacturer agreeing to repair or replace standing-seam roof panel assemblies that fail to remain weather tight within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, any manufacturer that has been approved by DFCM is approved for bidding. The list of approved manufacturers can be accessed at http://www.dfcu.utah.gov/downloads/bldg_official/approved_fabricator_list_13.pdf.
1. Other manufactures meeting the requirements may be accepted. Approval prior to bid from DFCM is required. See section 01631 for substitution requirements.
- B. Acceptable alternate structure: Subject to compliance with requirements, rolled structural steel shapes and/or open-web members may be used in lieu of a pre-engineered steel frame.

2.2 STRUCTURAL-FRAMING MATERIALS

- A. Structural-Steel Shapes: ASTM A 36/A 36M or ASTM A 529/A 529M.
- B. Steel Plate, Bar, or Strip: ASTM A 529/A 529M, ASTM A 570/A 570M, or ASTM A 572/A 572M; 50,000-psi minimum yield strength.
- C. Steel Tubing or Pipe: ASTM A 500, Grade B or ASTM A 53, Grade B.
- D. Structural-Steel Sheet: Hot-rolled, ASTM A 570/A 570M, Grade 50 or Grade 55; hot-rolled, ASTM 568/A 568M; or cold-rolled, ASTM A 611, structural-quality, matte (dull) finish.
- E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 50, with G60 (Z180) coating designation; mill phosphatized.
- F. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by

Lehi Maintenance Building

the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M and the following requirements:

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality. Galvalume accepted.
- G. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers. Size bolts for primary systems but not less than 5/8" diameter.
1. Finish: Hot-dip zinc coating, ASTM A 153, Class C.
- H. Anchor Rods, Bolts, Nuts, and Washers: As follows:
1. Unheaded Rods: ASTM A 572/A 572M, Grade 50 (Grade 345).
 2. Headed Bolts: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts.
 3. Washers: ASTM A 36/A 36M.
- I. Primers: As selected by manufacturer for resistance to normal atmospheric corrosion, compatibility with finish paint systems, capability to provide a sound foundation for field-applied topcoats despite prolonged exposure, and as follows:
1. Primer: Manufacturer's standard, lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2.3 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M and the following requirements:
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality. Aluminum-zinc alloy-coated steel accepted.
 2. Surface: Smooth, flat, mill finish.
 3. Trapezoidal Structural Standing Seam Roof System, 24" wide, 24 gauge minimum, field seamed system, 3" High. Roof panels begin and end with a 3" high seam, and concealed fasteners as manufactured by MBCI, Model Double-Lok or prior approved equal.
 4. Architectural wall panel, 36" wide, 24 gauge minimum, smooth with beads at 4" on center. Concealed fastener system. MBCI, model number FW120-2 or prior approved equal.
 5. Architectural Soffit panel, 24 gauge minimum, smooth with beads at 4" on center. Concealed fastener system. MBCI, Artisan series L12 with beads or prior approved equal.
- B. Panel Sealants: Provide the following:
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic,

Lehi Maintenance Building

nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

2. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in panels and remain weathertight; and as recommended by metal building system manufacturer. Non hardening.

2.4 MISCELLANEOUS MATERIALS

- A. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- B. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and with a 30-minute working time.
- C. Shop Primer for Galvanized Metal Surfaces: Zinc dust, zinc-oxide primer selected by manufacturer for compatibility with substrate. Comply with FS TT-P-641.
- D. Flexible weather resistant EPDM pipe flashing. Isolates piping from building movement. Acceptable product, Dektite as manufactured by ITW Buildex (708-595-3500) or prior approved equal.

2.6 FABRICATION, GENERAL

- A. General: Design components and field connections required for erection to permit easy assembly and disassembly.
 1. Fabricate components in a manner that once assembled in the shop, they may be disassembled, repackaged, and reassembled in the field.
 2. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 3. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.
- B. Primary Framing: Shop-fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 1. Make shop connections by welding continuous or by using high-strength bolts.
 2. Join flanges to webs of continuous built-up members by a continuous submerged arc-welding process.
 3. Brace compression flange of primary framing by angles connected between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 4. Weld clips to frames for attaching secondary framing members.
 5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.

- C. Secondary Framing: Shop-fabricate framing components to indicated size and section by roll-forming or break-forming, with base plates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
 - 1. Make shop connections by welding or by using high-strength bolts.
 - 2. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime secondary structural members with specified primer after fabrication.
- D. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply the specified air-dried primer immediately after cleaning and pretreating.
 - 1. Prime primary, secondary, and end-wall steel framing members with specified primer to a minimum dry film thickness of 1 mil. Prime secondary steel framing formed from metallic-coated steel sheet with red-oxide polyester paint, with a minimum dry film thickness of 0.5 mil on each side.
 - 2. Prime galvanized members, after phosphoric acid pretreatment, with manufacturer's standard zinc dust, zinc-oxide primer.
- E. Tolerances: Comply with MBMA's "Low Rise Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."

2.7 STRUCTURAL FRAMING

- A. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing. If build-up sections are used out of plate, continuous welding shall be employed on at least one side and intermittent welds on the opposite side to suite design requirements.
 - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 - 2. Rigid Frames: I-shaped frame sections fabricated from continuous shop-welded, built-up steel plates Minimum plate thickness of 1/4" or structural-steel shapes.
 - 3. Frame Configuration: See plans.
 - 4. Exterior Column Type: Straight.
 - 5. Rafter Type: Tapered.
- B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
 - 1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.125 inch.
 - 2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch.

- C. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet prepainted with coil coating, unless otherwise indicated, to comply with the following:
1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch wide flanges.
 2. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 45 to 50 degrees to flange and with minimum 2-1/2-inch wide flanges.
 3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate backup for both roof and wall panels.
 4. Flange and Sag Bracing: Minimum 1-5/8-by-1-5/8-inch structural-steel angles, with a minimum thickness of 0.0598 inch, to stiffen primary frame flanges.
 5. Base or Sill Angles: Minimum 3-by-2-by-0.0747-inch zinc-coated steel sheet.
 6. Purlin and Girt Clips: Minimum 0.0747-inch thick, steel sheet.
 7. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0747-inch thick, steel sheet.
 8. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
 9. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or steel sheet; designed to withstand required loads.
- D. Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade D; or ASTM A 529/A 529M, Grade 50; 1/2-inch diameter steel minimum; threaded full length or threaded a minimum of 12 inches at each end.
 2. Cable bracing is not allowed.
 3. Angles fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
 4. Rigid Portal Frames: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 5. Fixed-Base Columns: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 6. Diaphragm Action of Panels: Design metal building to resist wind forces through diaphragm action of roof, wall panels and rod bracing.
 7. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.
- E. Bolts: Provide shop-painted bolts unless structural-framing components are in direct contact with roof and wall panels. Provide zinc-plated bolts when structural-framing

components are in direct contact with roof and wall panels. The primary frame shall use a minimum bolt size of 5/8" diameter A325 or higher strength.

2.8 ROOF PANELS

- A. Structural Standing-Seam Roof Panels: Manufacturer's standard panels complying with the following:
1. Ribbed Roof Panels: Fabricate from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 24-inch coverage; with 3-inch high (including seam), raised trapezoidal major ribs at panel edges, and intermediate stiffening ribs symmetrically spaced between major ribs for full length of panel. Field seamed. Comply with the following:
 - a. Material: Zinc-coated (galvanized) steel.
 - b. Yield Strength: 50 ksi.
 - c. Metal Thickness: 0.0239 inch minimum.
 - d. Joint Type: Folded, mechanically seamed type.
 - e. Clip System: Floating to accommodate thermal movement (high clip system).
- B. Roof Panel Accessories: Provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.
1. Closures: Provide closures at eave and ridge, fabricated of same metal as roof panels.
 2. Clips: Minimum 0.0625-inch thick, stainless-steel panel clips designed to withstand negative-load requirements.
 3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch thick, stainless-steel or nylon-coated aluminum sheet.
 4. Thermal Spacer Blocks: Where panels attach directly to purlins, provide 1-inch thick, thermal spacer blocks; fabricated from extruded polystyrene.
 5. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- C. Exterior Finish: Apply the following coil coating to roof panels and accessories:
1. Modified Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat.
 - a. Basis of Design: MBCI, Signature 200.
 - b. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of five according to ASTM D 4214; and without fading in excess of seven Hunter units.
 2. Colors, Textures, and Glosses: As selected by Architect from manufacturer's full

Lehi Maintenance Building

range for these characteristics. Match existing metal building panels.

- D. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

2.9 WALL PANELS

- A. Wall Panels: Provide manufacturer's standard Architectural panels complying with the following:
 - 1. Beaded Panels: Fabricate from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 36-inch coverage, beads at 4-inches o.c. Design panels for mechanical attachment to structure using concealed fasteners, lapping major ribs at panel edges. Comply with the following:
 - a. Material: Zinc-coated (galvanized) steel. Or Aluminum-zinc alloy-coated steel.
 - b. Yield Strength: 50 ksi.
 - c. Metal Thickness: 24 gauge minimum or as required for wind exposure.
 - d. Panel Thickness: 1.5 inches.
- B. Wall Panel Accessories: Provide components required for a complete wall panel assembly, including trim, copings, mullions, sills, corner units, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.
 - 1. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- C. Exposed Finish for Exterior Panels: Apply the following coil coating:
 - 1. Modified Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat.
 - a. Basis of Design: MBCI, Signature 200.
 - b. Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of eight according to ASTM D 4214; and without fading in excess of five Hunter units.
 - 2. Colors, Textures, and Glosses: As selected by Architect from manufacturer's full range for these characteristics. Match existing metal building panels.
- D. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

2.10 FASCIA AND SOFFIT PANELS

Lehi Maintenance Building

- A. Fascia Panels: Manufacturer's standard panels complying with the following:
 - 1. Match roof panel profile and material.
 - 2. Flat-Pan Panels: Fabricate from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 12-inch coverage; with 1-inch high, inverted-L, standing-seam, vertical ribs at panel edges. Design panels for mechanical attachment to fascia supports using concealed clips in side laps. Factory apply sealant at each interlocking joint. Comply with the following:
 - a. Material: Zinc-coated (galvanized) steel.
 - b. Yield Strength: 50 ksi.
 - c. Metal Thickness: 24 gauge minimum.
 - d. Joint Type: As standard with manufacturer.
 - e. Clip System: Floating to accommodate thermal movement.

2.11 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer, and complying with the following:
 - 1. Provide sheet metal accessories of same material and in same finish as roof and wall panels, unless otherwise indicated.
- B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of roof or wall sheets by means of plastic caps or factory-applied coating. Comply with the following:
 - 1. Fasteners for Roof and Wall Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of panels.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- C. Flashing and Trim: Form from 0.0179-inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent roof or wall panels.
 - 1. Opening Trim: Painted subframing of suitable thickness to protect overhead door operation. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- D. Closures: Closed-cell, laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match roof and wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

Lehi Maintenance Building

- E. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.13 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.14 SOURCE QUALITY CONTROL

- A. Owner may employ an independent testing agency to perform source quality-control testing and special inspections, and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
 - 2. Allow Owner's testing agency access to places where structural framing is being fabricated or produced. Cooperate with Owner's testing agency and provide samples of materials as may be requested for additional testing and evaluation.
 - 3. Special inspections will not be required when fabrication is performed by a fabricator registered and approved by authorities having jurisdiction to perform such work without special inspection.
- B. Correct deficiencies in or remove and replace structural framing that inspections and test reports indicate do not comply with requirements.
- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with requirements.
- D. Shop-bolted connections will be tested and inspected according to RCSC's "Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Shop-bolted connections will be tested and inspected according to RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 1. Direct-tension indicator gaps will be verified to comply with ASTM F 959, Table 2.
- F. In addition to visual inspection, shop welding will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option:
 - 1. Liquid-Penetrant Inspection: ASTM E 165.
- G. In addition to visual inspection, shop-welded shear connectors will be inspected and tested according to requirements of AWS D1.1 for stud welding and as follows:
 - 1. Bend tests may performed when visual inspections reveal either less than a

Lehi Maintenance Building

- continuous 360-degree flash or welding repairs to any shear connector.
- 2. Tests may be conducted on additional shear connectors when weld fracture occurs on shear connectors already tested, according to requirements of AWS D1.1.
- H. Testing agency will report test results promptly and in writing to Owner, Contractor and Architect/Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of metal building system.
- B. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces, baseplates, and anchor bolts to receive structural framing. Verify compliance with requirements and metal building system manufacturer's tolerances.
 - 1. Engage land surveyor to perform surveying.

3.2 PREPARATION

- A. Clean substrates of substances, including oil, grease, rolling compounds, incompatible primers, and loose mill scale that impair bond of erection materials.
- B. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

3.3 ERECTION

- A. Erect metal building system according to manufacturer's written instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Baseplates and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting baseplates and bearing plates. Clean bottom surface of baseplates and bearing plates.
 - 1. Set baseplates and bearing plates for structural members on wedges, shims, or setting nuts.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of

- baseplate or bearing plate before packing with grout.
 - 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 4. Comply with manufacturer's written instructions for proprietary grout materials.
- E. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in elevations and alignment.
- 1. Level and plumb individual members of structure.
 - 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- F. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.
- 1. Make field connections using high-strength bolts. Tighten bolts by turn-of-the-nut method.
- G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts. Hold rigidly to a straight line by sag rods.
- 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 - 2. Locate and space wall girts to suit door and window arrangements and heights.
 - 3. Locate canopy framing as indicated.
 - 4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
- 1. Tighten rod bracing to avoid sag.
 - 2. Locate interior end bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to building structural frame.

3.4 ROOF PANEL INSTALLATION

- A. General: Provide roof panels of full length from eave to ridge when possible. Install panels perpendicular to purlins.
- 1. Field cutting by torch is not permitted.
 - 2. Rigidly fasten eave end of roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.

3. Provide weatherseal under ridge cap.
 4. Flash and seal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 5. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 6. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
 7. Locate and space fastenings in true vertical and horizontal alignment.
 8. Install ridge caps as roof panel work proceeds.
 9. Locate panel splices over, but not attached to, structural supports. Stagger panel splices to avoid a four-panel lap splice condition.
 10. Provide weather-resistant escutcheons for pipe and conduit penetrating roofing panels.
- B. Standing-Seam Roof Panels: Fasten roof panels to purlins with concealed clips at each standing-seam joint. Install clips at location and spacing determined by manufacturer.
1. Install clips to supports with self-drilling fasteners.
 2. Crimp standing seams with manufacturer-approved motorized seamer tool so clip, panel, and factory-applied side-lap sealant are completely engaged.
 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl sealant and fastened together by interlocking clamping plates.

3.5 WALL PANEL INSTALLATION

- A. General: Provide panels full height of building. Install panels perpendicular to girts.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weather tight enclosure. Avoid "panel creep" or application not true to line.
 2. Unless otherwise indicated, begin panel installation at corners with center of rib lined up with line of framing.
 3. Field cutting by torch is not permitted.
 4. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws.
 5. Fasten flashing and trim around openings and similar elements with self-tapping screws.
 6. When two rows of panels are required, lap panels 4 inches minimum. Locate panel splices over structural supports.
 7. Install continuous thermal break on all girts.
 8. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 9. Provide weather-resistant escutcheons for pipe and conduit penetrating exterior walls.
 10. Flash and seal wall panels with weather closures under eaves and rakes, along lower panel edges, and at perimeter of all openings.
 11. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing. Handle and apply sealant

- and backup according to sealant manufacturer's written instructions.
- 12. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
- 13. Locate and space fastenings in true vertical and horizontal alignment.
- 14. Align wall panel joints with soffit panels and roof panel.

3.6 FASCIA AND SOFFIT PANEL INSTALLATION

- A. General: Provide panels full width of fasciae and soffits. Install panels perpendicular to support framing.
 - 1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted panels one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 - 2. Field cutting by torch is not permitted.
 - 3. Fasten flashing and trim around openings and similar elements with self-tapping screws.
 - 4. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 - 5. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
 - 6. Locate and space fastenings in true vertical and horizontal alignment.
 - 7. Align all seams with wall panels.
- B. Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.7 ACCESSORY INSTALLATION

- A. General: Install ventilators, louvers, and other accessories according to manufacturer's written instructions, with positive anchorage to building and weathertight mounting. Coordinate installation with flashings and other components.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10-feet with no joints allowed within 24-inches of corner or intersection. Where lapped or bayonet-type expansion provisions

- cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant (concealed within joints).
3. Separations: Separate metal from incompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
- C. Pipe Flashing: Form EPDM flashing around pipe penetration and roof panels. Fasten and seal to roof panel as recommended by manufacturer.
- D. Louvers: Set louvers complete with necessary hardware, anchors, dampers, weather guards, and equipment supports according to manufacturer's written instructions. Locate and place louver units level, plumb, and at indicated alignment with adjacent work.
1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
 2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
 3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
 4. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses, where required to make louver joints weathertight. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.8 ERECTION AND LOCATION TOLERANCES

- A. Structural-Steel Erection Tolerances: Comply with erection tolerance limits of AISC S303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Roof Panel Installation Tolerances: Shim and align units within installed tolerance of 1/4 inch in 20-feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Wall Panel Installation Tolerances: Shim and align units within installed tolerance of 1/4 inch in 20-feet on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field quality-control testing.
- B. Extent and Testing Methodology: Testing and verification procedures will be required of high-strength bolted connections. AISC and RCSC allow turn-of-the-nut method, calibrated wrench, alternative design bolts, and direct-tension indicators for bolt-tension testing. Add actual requirements if other than AISC's "10 percent" will be inspected.
1. Bolted connections will be visually inspected.
 2. High-strength, field-bolted connections will be tested and verified according to

procedures in RCSC's "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

- C. Testing agency will report test results promptly and in writing to Contractor and Owner.

3.10 CLEANING AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean, prepare, and prime or reprime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.
 - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 - 2. Apply compatible primer of same type as shop primer used on adjacent surfaces.
- B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- C. Roof and Wall Panels: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.
 - 1. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 13125

SECTION 15000 – GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 GENERAL

- A. Furnish all labor, materials and equipment necessary for completion of the mechanical work as indicated in the project documents.
- B. Furnish and install all motors specified and be responsible for the proper operation of all electrical powered equipment installed as a part of this work.
- C. Furnish exact location of electrical connections and information on motor controls to electrician.
- D. Place all mechanical systems in operation and continuing operation through testing and balancing.
- E. Make changes in pulleys, belts, and dampers as required for the correct balance as required at no additional cost to the Owner.

1.2 PRODUCT DATA

- A. Submit Product Data.

1.3 CODES

- A. The work shall be installed in accordance with all applicable Codes.

1.4 MANUALS

- A. Provide 2 sets of operation and maintenance manuals upon completion of the work.

END OF SECTION 15000

SECTION 15050 - BASIC MATERIALS & METHODS

PART 1 - GENERAL

1.1 GENERAL

- A. Division 15000 General applies to this Section.

1.2 COORDINATION OF WORK

- A. It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for the installation of systems according to the true intent and meaning of the Contract Documents. Anything not clear or in conflict will be explained by making application to the Architect in writing. Should conditions arise where certain changes would be advisable, secure Owner's and Architect's approval for these changes before proceeding with work.
- B. Coordinate work of various trades in installing interrelated work. Before installation of mechanical items, make proper provision to avoid interference's in a manner approved by Architect. Changes required in work specified in Division 15 caused by neglect to secure approval shall be made at no cost to Owner.
- C. Arrange piping, ductwork, and equipment to permit ready access to valves, unions, traps, starters, motors, control components, and to clear openings of doors and access panels. Mechanical Contractor shall provide all necessary access doors and/or panels to provide complete access to all mechanical equipment valves or accessories. Coordinate openings in walls and hard ceilings with general contractor to provide access doors and provide access doors where this coordination or other provisions have not been made. Doors for valves, piping, dampers, etc. shall be minimum 12" x 12" and doors for mechanical equipment shall be minimum 24" x 24".
- D. Furnish and install inserts and supports required by Division 15 unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions involved in sufficient time to be built into the construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by Division 15.
- E. Be responsible for required digging, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Owner and Architect. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
 - 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
 - 2. This Division shall bear expense of cutting, patching, repairing, and replacing of work of other Divisions because of its fault, error, tardiness, or because of damage done by it.
 - 3. Provide the necessary cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division.

Lehi Maintenance Building

- F. Adjust locations of piping, ductwork, equipment, fixtures, etc, to accommodate work from interference's anticipated and encountered. Determine exact route and location of each pipe and cut prior to fabrication.
 - 1. Make offsets, transitions, and changes in direction of piping, ductwork, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings. Furnish and install traps, air vents, sanitary vents, pull boxes, etc, as required to effect these offsets, transitions, and changes in direction.
- G. Slots and openings through floors, walls, ceiling, and roofs shall be provided by other Divisions, but this Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.
- H. This Contractor shall schedule his work, store his equipment and materials, and work in harmony with other Contractors so as to not delay or jeopardize the construction.
- I. This Division shall coordinate with electrical contractor to insure that all required components of control work are included and fully understood. Any discrepancies shall be called to the attention of the Architect before completion of bids. No additional cost shall accrue to the Owner as a result of lack of such coordination.

1.3 EQUIPMENT & MATERIALS

- A. Requests for substitution shall be received in writing a minimum of seven days prior to bidding. Prior acceptance shall be by Manufacturer's name only. Items not listed in this specification or subsequent addenda shall not be considered. No oral approvals will be acceptable. Manufacturers listed in this specification are acceptable only for items listed. All other items manufacturer wishes to bid must be prior approved. This includes plumbing items. All equipment shall be subject to final review in accordance with "Project Submittals".
- B. Product Approvals -
 - 1. If approval is received to use other than specified items, responsibility for specified capacities and insuring that items to be furnished will fit space available lies with this Division.
 - 2. In the event other than specified equipment is used and will not fit job site conditions, this Division assumes responsibility for replacement with items named in Specification.
- C. Use domestic made pipe, pipe fittings, and motors on Project.
- D. Motor and equipment name plates as well as applicable UL labels shall be in place when Project is turned over to Owner.
- E. Insure that items to be furnished fit spaces available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent

and meaning of Contract Documents. Do not scale off drawings.

- F. All materials shall be of the best commercial quality obtainable, consistent with specified materials and for the purpose or function intended. Materials shall be new unless specifically excepted.
- G. Equipment catalog or model numbers shown define the basic equipment types and quality standard only. Catalog numbers shall not be considered as all inclusive and shall be verified to include all devices, controls, operators, and appurtenances necessary for the satisfactory and complete operation of the equipment.
- H. Follow manufacturer's directions in delivery, storage, protection, and installation of equipment and materials.
 - 1. Promptly notify Architect in writing of conflicts between requirements of Contract Documents and Manufacturer's directions and obtain Architect's written instructions before proceeding with work. Contractor shall bear all expenses arising from correcting deficiencies of work that does not comply with Manufacturer's directions or such written instructions from Architect.
- I. Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in a dry heated space.

1.4 PROJECT SUBMITTALS

- A. Furnish complete catalog data for manufactured items of equipment to be used in the Work to Architect for review within 30 days after award of Contract.
- B. Submittal shall include, but not be limited to the following:
 - 1. Equipment scheduled
 - 2. Valves
 - 3. Insulation and duct liner
 - 4. Registers, grilles, and diffusers
 - 5. Automatic temperature controls
 - 6. Certificates of guarantee
 - 7. Plumbing fixtures, trim and specialties
 - 8. Any item for which more than one manufacturer is mentioned
- C. Submit a minimum of five copies of data in binders and index in same order and name as they appear in Specification.
 - 1. State sizes, capacities, brand names, motor HP, electrical requirements, accessories, materials, gauges, dimensions, and other pertinent information.
 - 2. List on catalog covers page numbers of submitted items.
 - 3. Underline applicable data.
- D. If material or equipment is not as specified or submittal is not complete, it will be rejected by Architect.

- E. Catalog data or shop drawings for equipment which are noted as being reviewed by Architect or his Engineer shall not supercede Contract Documents.
- F. Review comments of Architect shall not relieve this Division from responsibility for deviations from Contract Documents unless Architect's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.
- G. Check work described by catalog data with Contract Documents for deviations and errors.
- H. All items other than first named specified equipment shall show and state all exceptions and deviations taken and shall include design calculations.
- I. The Contractor shall review the submittals prior to submission to the Architect to make sure that the submittals are complete in all details. No submittal will be reviewed which does not bear the contractor's notation that such checking has been made.
- J. No partial submittals will be considered unless approved by the engineer.
- K. Manufacturers' names shall be mentioned as acceptable prior to bidding. See paragraph 3a above.
- L. Mechanical Contractor shall verify equipment dimensions to fit the spaces provided with sufficient clearance for servicing the equipment.
- M. Mechanical Contractor shall review equipment submittals for compliance with schedules, specifications, and drawing plans and details. Equipment submittal shall show the proper arrangements to suit installation and maintenance such as motor location, access doors, filter removal, piping connections, etc.
- N. Equipment submittal sheets shall be clearly marked indicating equipment symbol and exact selection of proposed equipment. Submittals shall clearly indicate name of manufacturer of each item.
- O. For unacceptable items, the right shall be reserved to require the first named specified items.

1.5 CLEANING & FINISHING

- A. Contractor shall, at all times, keep the premises free from waste material and rubbish. Upon completion of this Section of the work, Mechanical Contractor shall remove all surplus materials and rubbish; clean all spots resulting from the mechanical work from hardware, floors, glass, walls, etc.; do all required patching up and repair all work of other trades damaged by Mechanical Contractor under this Section of the work, and leave the premises in a clean orderly condition. Clean heating and cooling coils, internally and externally, and replace all air filters prior to final mechanical inspection. Remove rust, plaster, dirt, grease and oil before painting, insulating, or exposing to view the equipment, piping, ductwork, etc. in completed structure. Refinish any damaged surfaces and leave in proper working order at final

Lehi Maintenance Building

completion.

1.6 EQUIPMENT SERVICING

- A. Prior to starting mechanical equipment, all motors, bearings and moving parts shall be properly oiled, greased and lubricated as required. Full and adequate maintenance service shall be given and upon completion all equipment shall be cleaned and checked and placed in perfect condition for the Owner.
- B. Provide lubrication for the following:
 - 1. Furnaces and radiant heaters
 - 2. Exhaust fans
 - 3. Damper motors
- C. Amount and type of lubricant shall be per manufacturer's specification.

1.7 SUPERVISION

- A. The Contractor shall supervise and direct the work with his best skill and attention. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The Contractor will be responsible to see that the finished work complies accurately with the Contract Documents.

1.8 SAFETY REGULATIONS

- A. Contractor shall provide equipment, supervision, construction, procedures, and everything necessary to assure safety of life or property.
- B. Refer also to General Condition and Special Conditions for protection clauses.

1.9 LEAK DAMAGE

- A. Mechanical Contractor shall be responsible for damages to the work of other Contractors or to the building, or to its contents, people, etc., caused by leaks in any of the equipment or piping installed by him through equipment or material failures, leaking joints or disconnected pipes, fittings, or by overflows and shall make at his own expense all repairs to fixtures, building interior, contents, paint, rugs, furniture, ceiling tile, and equipment so damaged.

1.10 TOOLS AND STORAGE OF EQUIPMENT

- A. The Mechanical Contractor shall furnish all necessary tools, staging and whatever may be necessary for the installation of this work and shall at all times protect this work and others, and the materials to be used therein from damage by the weather, accident and other causes, and shall repair and make good any damage thus occurring.

1.11 WORKMANSHIP

- A. Workmanship shall be the best quality of its kind for respective industries, trades, crafts

Lehi Maintenance Building

and practices and shall be acceptable in every respect to the Owner and Architect. Nothing contained herein shall relieve the Mechanical Contractor from performing good work, perfect in all details of construction.

1.12 TEMPORARY FACILITIES

- A. Furnishing of temporary water, space heating, sanitary facilities, drainage lines, light and power will be as specified in Division 01 General Conditions. Mechanical Contractor shall arrange with the General Contractor to bring facilities to required location of premises. All expenses involved shall be paid by the Contractor as described in General and Special Conditions.

1.13 PAINTING BY MECHANICAL CONTRACTOR

- A. See section 09900 for painting requirements.
- B. Painting shall be by persons experienced in painting. Mechanical Contractor shall use the project painting Contractor as his Subcontractor for painting under this section.
- C. All exposed, insulated, and bare piping, equipment, metal stands and supports shall be painted as follows:
 - 1. The prime coat on heating units, grilles, and diffusers shall be factory applied. The finish coats shall be applied under this Section of these specifications.
 - 2. All equipment which is to be furnished in finished painted condition by Mechanical Contractor shall be left without mark, scratch or impairment to finish upon completion and acceptance of job. Any necessary refinishing to match original shall be done by Mechanical Contractor. Do not paint over name plates, serial numbers or other identifying marks.

1.14 EQUIPMENT BASES

- A. Provide reinforced concrete bases under furnace units, and air compressor. Coordinate work with Division 03.
- B. Bases shall be 4" high, above the finish grade. The base shall extend beyond the equipment 4" in all directions, where possible. Inserts and vibration isolation systems shall be provided and installed by the Mechanical Contractor at the time the concrete is poured to accommodate and anchor the equipment used. Coordinate with vibration isolation manufacturer's requirements and Section 15 200.

1.15 BELT GUARDS

- A. Shall be provided, properly enclosing each belt drive system. Guards shall be easily removable, constructed of expanded metal with suitable frames corresponding with SMACNA standard and with tachometer openings. Coordinate with equipment suppliers to avoid duplication of belt guards supplied with equipment.
- B. Guards shall comply with OSHA Regulations.

Lehi Maintenance Building

1.16 ELECTRICAL WORK

- A. Power wiring to all electrically driven apparatus shall be done under the electrical contract. See Electrical Specifications.
- B. Unless specifically noted otherwise on mechanical documents, Electrical Contractor shall furnish and install all magnetic starters including properly sized heaters, and disconnect switches as indicated on drawings or required by code.
- C. The Mechanical Contractor shall verify the proper operation of equipment furnished by him. Costs for repair, replacing, re-wiring and re-testing shall be borne by the Mechanical Contractor without additional costs to the Owner.
- D. Submit all data on electrical control equipment not included by the automatic temperature control diagrams. Information shall include the manufacturer's name, circuit drawings, ratings, voltage, and other operating characteristics and locations. Wiring diagrams and control equipment shown on the drawings are for the first named specified equipment. Any changes or additions required to accommodate the furnished equipment shall be the responsibility of the Mechanical Contractor.

1.17 CONTRACTOR'S USE OF BUILDING EQUIPMENT

- A. The Contractor may use equipment such as electric motors, fans, filters, etc. when permanently installed as part of the project and with the written permission of the Owner. As each piece of equipment is used, maintenance procedures approved by the manufacturer shall be followed, a careful record shall be kept of the time used, maintenance procedure followed and of any difficulty experienced with equipment. The Contractor's records on the equipment shall be submitted to the Owner upon acceptance of project. All fan belts and filter media shall be new at the beginning of the Mechanical System Operating Test Run and System Balancing. Wearing surfaces (such as bearings) shall be carefully inspected just prior to acceptance. Any excessive wear noted shall require replacement.

1.18 INSPECTION NOTICE

- A. The following is a basic list of guideline items so that the Architect, local plumbing inspector and Owner can be at job site for these inspections as the building progresses. Mechanical Contractor shall inform these people one week in advance of test time.
 - 1. Water tests on all sewer, waste, and rainwater piping prior to piping being concealed.
 - 2. Pressure tests on all water service piping and gas piping.
 - 3. All duct work prior to installation of finished ceilings, including ductwork pressure testing. Underground ductwork, prior to covering with concrete.
 - 4. The initial start-up of mechanical equipment, etc.
 - 5. Any changes or problems occurring at job site.
 - 6. Inspect all vent flashings on roof prior to roofing.
 - 7. Periodic inspection at their discretion will be made to insure compliance to Contract Documents and codes. Contractor shall provide ladders, access and

Lehi Maintenance Building

other assistance as requested during inspections.

8. Final inspection before giving approval for final payment.

1.19 EXCAVATION AND BACKFILLING

- A. All excavation and backfilling shall be done as described in Division 02.
- B. Trenches for underground pipe lines shall be excavated to the required depth. Rocks, trash, or other debris will not be allowed in trench or backfill and shall be removed before pipe is laid in place. After piping has been tested, inspected and approved, piping shall be backfilled.

1.20 WARRANTY GUARANTEE

- A. The Contractor shall warrant all materials and equipment to be of quality consistent with specifications as represented by manufacturer's published data.
- B. The Contractor shall guarantee that the installation and operation of the equipment shall be free from defects for a period of one year beginning at date of substantial completion and acceptance. The Contractor shall replace or repair any part of the installation that is found to be defective or incomplete within the guarantee period.
- C. The one year guarantee on equipment and systems shall commence when equipment has been demonstrated to work and has been accepted. (Example: If an equipment item fails to perform and it takes 9 months after substantial completion to correct, then the guarantee shall commence after the item has been demonstrated to perform and has been accepted.)
- D. Substantial completion and acceptance in no way relieves the Contractor from providing the systems and equipment as specified.

1.21 COMPLETION SCHEDULE

- A. Start-up and verification of basic equipment items shall be done prior to the date of substantial completion with sufficient time to allow balancing and adjusting to be performed.
- B. At the time of the final inspection a date shall be agreed upon for completion of any remaining items. At least double the estimated cost of the work will be withheld from the Contractor's payment.
- C. The air balance reports, duct pressure test reports and plumbing disinfectant reports shall be submitted to the Owner and Architect prior to substantial completion.

END OF SECTION 15050

SECTION 15055 - COMMON PIPING REQUIREMENTS

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

- A. Hanger and Pipe Attachments: Factory fabricated with galvanized coatings; nonmetallic coated for hangers in direct contact with copper tubing.
- B. Building Attachments: Powder-actuated-type, drive-pin attachments with pullout and shear capacities appropriate for supported loads and building materials; UL listing and FM approval for fire-protection systems.
- C. Mechanical-Anchor Fasteners: Insert-type attachments with pullout and shear capacities appropriate for supported loads and building materials; UL listing and FM approval for fire-protection systems.

PART 3 - EXECUTION

3.1 INSTALLATION

Install piping free of sags and bends.

Install fittings for changes in direction and branch connections.

Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor, and roof slabs.

Exterior Wall, Pipe Penetrations: Mechanical sleeve seals installed in steel or cast-iron pipes for wall sleeves.

Install dielectric unions and flanges to connect piping materials of dissimilar metals in gas, compressed air, and vacuum piping.

Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals in water and steam piping.

3.2 HANGERS AND SUPPORTS

Install building attachments within concrete or to structural steel. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.

Install powder-actuated drive-pin fasteners in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.

Install mechanical-anchor fasteners in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches (100 mm) thick.

Lehi Maintenance Building

Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

END OF SECTION 15055

SECTION 15110 - VALVES

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 GENERAL-DUTY VALVES

- A. End Connections: Threads shall comply with ANSI B1.20.1. Flanges shall comply with ANSI B16.1 for cast-iron valves and ANSI B16.24 for bronze valves. Solder-joint connections shall comply with ANSI B16.18.
- B. Gate Valves: Class 125, cast-bronze body and bonnet; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable-iron handwheel.
- C. Ball Valves: Rated for 150-psig (1035-kPa) saturated steam pressure, 400-psig (2760-kPa) WOG pressure; 2-piece construction; with bronze body, standard (or regular) port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl-covered steel handle.
- D. Plug Valves: Rated at 150-psig (1035-kPa) WOG; bronze body, with straightaway pattern, square head, and threaded ends.
- E. Globe Valves: Class 125; body and screwed cast-bronze bonnet; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable-iron handwheel.
- F. Swing Check Valves: Class 125, cast-bronze body and cap; with horizontal swing, Y-pattern, and bronze disc; and with threaded or solder ends.
- G. Valves for Copper Tube: Solder ends, except provide threaded ends for heating hot water and low-pressure steam service.
- H. Valves for Steel Pipe: Threaded ends.

PART 3 - EXECUTION

INSTALLATION

Use gate and ball valves for shutoff duty; globe and ball for throttling duty.

Locate valves for easy access and provide separate support where necessary.

Install valves for each fixture and item of equipment.

Install 3-valve bypass around each pressure-reducing valve using throttling-type valves.

Install valves in horizontal piping with stem at or above center of pipe.

Lehi Maintenance Building

Install valves in a position to allow full stem movement.

Install check valves for proper direction of flow in horizontal position with hinge pin level.

END OF SECTION 15110

SECTION 15198 - NATURAL GAS PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Quality Assurance: Comply with NFPA 54.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND SPECIALTIES

Copper Tube: ASTM B 88, Type L, water tube, drawn temper.

Steel Pipe: ASTM A 53, Type S (Seamless), Grade B, Schedule 40, plain ends.

Copper Fittings: ASME B16.22, wrought copper, streamlined pattern.

Bronze Flanges and Flanged Fittings: ASME B16.24, Class 150.

Malleable-Iron Threaded Fittings: ASME B16.3, Class 150.

Brazing Filler Metals: AWS A5.8, Silver Classification BAg-1. Filler metal containing phosphorus is prohibited.

Manual Valves: Comply with standards listed or, if appropriate, to ANSI Z21.15.

Gas Stops: AGA-certified, bronze-body, plug type with bronze plug, for 2-psig (13.8-kPa) or less natural gas. Include AGA stamp, flat or square head or lever handle, and threaded ends complying with ASME B1.20.1.

Gas Valves: 150-psig (1035-kPa) WOG, cast-iron or bronze body, bronze plug, straightaway pattern, square head, tapered-plug type.

Electrically Operated, Automatic Shutoff Valves: ANSI Z21.21, for operation by appliance automatic shutoff device.

Earthquake-Activated Automatic Shutoff Valves: ANSI Z21.70, mechanically operated

Gas-Pressure Regulators: ANSI Z21.18, single-stage, steel-jacketed, corrosion-resistant pressure regulators. Include atmospheric vent, elevation compensator. Regulator pressure ratings, inlet and outlet pressures, and flow volume in cubic feet per hour (cubic millimeter per second) of natural gas at specific gravity are as indicated.

Line Gas-Pressure Regulators: Inlet pressure rating not less than system pressure.
Appliance Gas-Pressure Regulators: Inlet pressure rating not less than system pressure, with capacity and pressure setting matching appliance.

Gas-Pressure Regulator Vents: Factory- or field-installed corrosion-resistant screen in opening when not connected to vent piping.

Lehi Maintenance Building

Flexible Connectors: ANSI Z21.24, copper alloy.

Strainers: Bronze body, Y-pattern, full size of connecting piping. Include stainless-steel screens with 3/64-inch (1.2-mm) perforations and a pressure rating of 125-psig- (860-kPa-) minimum, WOG working pressure.

PART 3 - EXECUTION

INSTALLATION

Close equipment shutoff valves before turning off gas to premises or section of piping. Perform leakage test as specified to determine that all equipment is turned off in affected piping section.

Install shutoff valve, downstream from gas meter, outside building at gas service entrance.

Low-Pressure, 0.5-psig (3.5-kPa) or Less, Natural Gas Systems: Use the following:

1-Inch NPS (DN25) and Smaller: Steel pipe, malleable-iron threaded fittings, and threaded joints.

1-1/4-Inch NPS (DN32) and Larger: Steel pipe, malleable-iron threaded fittings, and threaded joints.

Medium-Pressure, 0.5- to 2-psig (3.5- to 13.8-kPa), Natural Gas Systems: Copper tube, wrought-copper fittings, and brazed joints.

Install gas stops for shutoff to appliances with 2-inch NPS (DN50) or smaller low-pressure gas supply.

Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of gas meters. Locate where readily accessible to permit cleaning and emptying. Do not install where condensate would be subject to freezing.

Install gas piping at uniform slope of 0.1 percent upward toward risers.

Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

Connect branch piping from top or side of horizontal piping.

Install strainers on supply side of each control valve, gas-pressure regulator, solenoid valve, and elsewhere as indicated.

Install valves in accessible locations, protected from damage. Tag valves with metal tag indicating piping supplied. Attach tag to valve with metal chain.

Install gas valve upstream from each gas-pressure regulator. Where 2 gas-pressure regulators are installed in series, valve is not required at second regulator.

Install earthquake-activated automatic shutoff valves according to authorities having

jurisdiction.

Install pressure-relief or pressure-limiting devices so they can be readily operated to determine if valve is free; test to determine pressure at which they will operate; and examine for leakage when in closed position.

Connect gas piping to equipment and appliances with shutoff valves and unions. Install gas valve upstream from and within 72 inches (1800 mm) of each appliance using gas. Install union or flanged connection downstream from valve.

Inspect, test, and purge piping according to NFPA 54, Part 4, "Gas Piping Inspection, Testing, and Purging"; and requirements of authorities having jurisdiction.

END OF SECTION 15198

SECTION 15200 - VIBRATION, NOISE CONTROL AND SEISMIC PROTECTION

PART 1 - GENERAL

1.1 REQUIREMENTS

- A. The General Provision of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this section.
- B. Requirements of Section 15000 apply to this section.
- C. Requirements of Section 15050 apply to this section.

1.2 SCOPE

- A. The work shall include all labor, materials, equipment, accessories, transportation and services included in installing all necessary seismic and vibration equipment.

1.3 QUALIFICATIONS

- A. The Mechanical Contractor shall be responsible for supplying and installing equipment, vibration isolators, flexible connections, rigid steel frames, etc. for all mechanical items to comply with the International Building Code and requirements of this specification.
- B. All supports, hangers, bases and bracing shall be designed by a professional engineer, with seismic experience in bracing for mechanical equipment.
- C. The contractor shall require all of the equipment suppliers to furnish equipment that meets the seismic code. All equipment, etc. shall be designed to meet the local seismic zone.
- D. Manufacturer and supplier of restraint and vibration isolation equipment and system approved for use by the contractor are, Amber Booth Co., Korfund, Mason Industries, and Vibration Mounting and Control Co.
- E. The approved manufacturer or supplier shall be totally responsible for the design, fabrication, installation and operation of the vibration and seismic bracing system specified.
- F. The manufacturer and supplier of restraint and vibration isolation equipment shall submit prior to fabrication the following data:
 - 1. Complete engineering calculations and shop drawings for all seismic requirements.
 - 2. Detail of seismic bracing with snubbers proposed installation instruction.
 - 3. Size and location of pipe and duct restraints.

PART 2 - PRODUCTS

2.1 VIBRATION AND NOISE CONTROL

Lehi Maintenance Building

- A. Equipment connected to piping, ductwork, floor, wall or overhead structure of building shall have flexible connections to prevent the transmission of vibration and mechanically transmitted sound to the building structure.
- B. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflection. Deflection recommendations shall be noted in submittal. Submittal shall include spring metal diameters, deflections, unloaded spring height, loaded spring height, solid spring height, clearance around housing and restraining bolts.
- C. Fans shall be mounted on rail-type isolating bases providing support and adjustment for belt center distance between motor and fan. Use steel spring isolators with air handling units. Mason type SLC spring and neoprene pad mounts.
- D. Steel Spring Isolators: Shall be free standing open coil type, rated for 95% efficiency or show 2" static deflection. All dimensionally stable; that is, loaded height shall be equal to spring diameter.
- E. Piping within 100 diameters or approximately 20 feet of piping run from motorized equipment shall be suspended on spring hangers with 1" deflection on natural pipe weight. Unions must be broken and deflection demonstrated when requested. Mason Type PDNHS.
- F. Where non-insulated pipes in which vibration may occur pass through walls, floors, or partitions, encase pipe within sleeve with one-inch thick sheet cork or other approved equal.
- G. Piping connection to all pumps, fans, etc. shall be isolated with a flexible hose. Flexible hoses, Mason Industries, Inc., Type RFH or RFM shall be used.
- H. Duct connections to all equipment shall be made with 3" fabric connector made for the purpose intended. Fabric shall be UL labeled flame resistant, airtight, waterproof, and rated to withstand temperatures to 250 degrees F. Manufacturers shall be Ventglas, Durodyne, Glasseal, or approved equivalent.
- I. Isolating hangers shall be open coil combination steel spring and neoprene in shear with deflection indication. Springs shall be selected for 95% efficiency. Mason Type TDNHS.
- J. Vibration Isolators
 - 1. General Properties
 - a. All vibration isolators shall have either known un-deflected heights or other markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
 - b. All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer and must be linear over a deflection range of 50% above the design deflections.
 - c. The ratio of lateral to vertical stiffness shall not be less than 1.0 or greater than +

- or - 10%.
- d. Water motion through the isolator shall be reduced to the following extent: Isolation above the resonant frequency shall follow the theoretical prediction based upon an un-damped single degree of freedom system, with a minimum isolation of 50 decibels above 150 cycles per second.
- e. All neoprene mounting shall have a shore hardness of 50 to 60 after minimum aging of 20 days or corresponding over aging.

2.2 SEISMIC RESTRAINTS

- A. General Requirements: Seismic restraints shall be provided for all vibration isolated equipment, both supported and suspended, and all vibration isolated piping and all other piping, ductwork, or equipment required by latest addition of IBC.
- B. For Supported Equipment: The seismic restraints shall consist of interlocking steel members restrained by shock absorbent neoprene materials compounded to bridge bearing specifications. The elastomeric materials shall be replaceable and be a minimum 3/4" thick. Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8", nor more than 1/4". Each snubber shall be capable of restraint in all three mutually orthogonal directions.
- C. Submittals shall include load versus deflection curves up to 1/2" in the x, y and z planes. Tests shall be conducted in an independent laboratory or under the signed supervision of an independent registered engineer. The snubber assemblies shall be bolted to the test machine as the snubber is normally installed. Test reports shall certify that neither the neoprene elements nor the snubber body has sustained any obvious deformation after release of the load.
- D. For Suspended Equipment and Piping:
 - 1. The seismic restraint shall consist of a combination of stranded steel aircraft cable and the specified vibration isolation hanger with an added nut and neoprene and steel washer. The cable resists lateral and downward motion. The modified vibration hanger resists upward motion.
 - 2. Cable attachment details, cable size and the neoprene and steel washers shall be sized by a structural engineer.
- E. The contractor shall not install any equipment or pipe which makes rigid contact with the "building" unless it is approved in this specification or by the architect. "Building" includes slabs, beams, studs, walls, lath, etc.
- F. The installation or use of vibration isolators must not cause any change of position of equipment or piping which would result in stresses in piping connections or misalignment of shafts or bearings. In order to meet this objective, equipment and piping shall be maintained in a rigid position during installation. The load shall not be transferred to the isolator until the installation is complete and under full operational load.
- G. The contractor shall correct, at no additional cost, all installations which are deemed defective in workmanship or materials by the architect.

PART 3 - EXECUTION

3.1 EQUIPMENT ISOLATOR INSTALLATION

- A. The equipment to be isolated shall be supported by a structural steel frame or by brackets attached directly to the machine where no frame is required.
- B. Brackets shall be provided to accommodate the isolator and provide a mechanical stop. The vertical position and size of the bracket shall be specified by the isolator manufacturer.
- C. The operating clearance between the bracket and the pad or floor shall be $3/4"$ + or - $1/16"$. The minimum operating clearance between the frame and the pad or floor shall be $1"$.
- D. The frame shall be placed in position and the brackets supported temporarily by $3/8"$ shims prior to the installation of the machine or isolators.
- E. After the entire system installation is completed and under full operational load, the isolator shall be adjusted so that the load is transferred from the shims to the isolator. When all isolators are properly adjusted, the shims will be barely free and shall be removed. Thereafter, the shims shall be used as a gauge to check that the $3/8"$ clearance is maintained so that the system will remain free of stress.
- F. Piping Isolator Installation - Vertical Riser or Horizontally Supported Piping:
 - 1. The isolators shall be installed with the isolator hanger box as close as possible to the structure.
 - 2. The isolators shall be suspended from overhead beams, never from slab diaphragms between beams unless specifically approved.
 - 3. Hanger rods shall be aligned to clear the hanger box.
 - 4. Load transfer isolators, when utilized, shall temporarily maintain the piping in a rigid position until installation is complete and fully loaded.

3.2 SEISMIC RESTRAINTS

- A. General: All seismic restraints must be installed and adjusted so that the equipment and piping vibration isolation is not degraded by utilization of the restraints.
- B. Supported Equipment: Each vibration isolation frame for supported equipment shall have a minimum of four seismic snubbers mounted as close as possible to the vibration isolators and/or the frame extremities. Care must be taken so that a minimum $1/8"$ air gap in the seismic restraint snubber is preserved on all sides in order that the vibration isolation potential of the isolator is not compromised. This requires that the final snubber adjustment shall not be completed until the vibration isolators are properly installed and the installation approved.
- C. Suspended Equipment and Piping: (Cable Method) The cables shall be adjusted to a degree of slackness approved by the structural engineer. The uplift and downward

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restraint nuts and washers for the Type HST Hangers shall be adjusted so that there is a minimum 1/4" clearance.

END OF SECTION 15200

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SECTION 15611 – GAS-FIRED FURNACES AND AIR CONDITIONING AND RADIANT TUBE HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:

1. Furnish and install Natural gas fired, fan forced furnace and air conditioning for the office area.
2. Provide Radiant tube heaters, in the shop area
3. Bathroom exhaust fans
4. Ductwork for office space.

B. Related Sections:

1. General Conditions, Division 01, and Section 15050 apply to this Section.

1.2 FURNACE A/C SYSTEM DESCRIPTION

A. Performance Requirements

1. Rated at 90% minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures. 16 SEER air conditioning unit.

PART 2 - PRODUCTS

2.1 GAS FIRED FURNACES AND A/C UNITS

A. Manufacturers:

1. Lennox
2. Rheem Air Conditioning
2. The Trane Company
4. Carrier
5. Substitutions: Section 01600 Product Requirements

B. Self-contained, packaged, factory assembled, pre -wired unit consisting of cabinet, supply fan, heat exchanger, burner, coils and remote condensing unit, operating controls, and accessories.

C. Duct work: Galvanized steel supply and return air.

D. Operating Controls:

1. Room Thermostat: Cycles burner to maintain room temperature setting. A single thermostat shall control the entire system. Locate thermostat at opposite end of room from heater.

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2. Supply Fan Control: Energize either from discharge temperature independent of burner controls or with timed off delay and timed on delay. Furnish manual switch for continuous fan operation.

2.2 GAS FIRED INFARED RADIANT TUBE HEATERS

A. Manufacturers:

1. Roberts Gordon Vantage
2. Reznor
3. Reverber Ray
4. Detroit Radiant
5. Substitutions: Section 01600 Product Requirements

I. Performance

1. Thermal efficiency rating at maximum and minimum rated capacity in accordance with ASHRAE 90.1.

2.3 ROOM THERMOSTATS

A. Manufacturers: Adjustable Room Thermostat: Low voltage, to control burner operation, and supply fan to maintain temperature setting. Include system selector switch (heat -off-cool) and fan control switch (auto -on)

1. Honeywell
2. Lennox
3. Rheem Air Conditioning
4. The Trane Company
5. Substitutions: Section 01600 Product Requirements.

PART 3 - EXECUTION

3.1 EXAMINTAIION

- #### A.
- Verify space is ready for installation of units and openings are as indicated on shop drawings.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service

1. Furnace and Radiant tube heater distributor's technical service representative shall start up and check out furnace and radiant tube heater equipment as follows:
 - a. Verify proper natural gas orifice size.
 - b. Clock gas meter for rated input.
 - c. Verify and set natural gas pressure at furnace.

Lehi Maintenance Building

- d. Check and measure temperature rise.
- e. Check safety controls for proper operation.
- f. Check flue sizes and combustion air sizes.

3.3 FURNACE AND RADIANT TUBE HEATER INSTALLATION

- A. Install in accordance with gas fired units to NFPA 54.
- B. Install Work in accordance with State, local and national standards.
- C. Install vent connections in accordance with NFPA 211.
- D. Install furnace with vibration isolation. Refer to Section 15200.
- E. Provide hangers and supports for suspended radiant tube heating units. Refer to Section 15050.
- F. Provide operating controls.
- G. Provide connection to electrical power systems. Refer to Section 16150.

END OF SECTION 15611

SECTION 15900 - HVAC CONTROLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Electric/electronic controls sequences for HVAC systems and equipment.
- B. Submit Shop Drawings detailing operating control sequences of each item of HVAC equipment and system.

Submit Product Data for controllers, sensors, operators, control panels, thermostats, humidistats, actuators, and control valves and dampers.

System Description: Units shall be supplied with heating only thermostat and transformer (where required). Thermostat shall be Honeywell or equal by Johnson or MCC Powers. Temperature controls shall be of the electric or electronic type. Thermostat shall be programmable low voltage type provided with seven day program with 2 stops and 2 starts per day. Thermostat shall be mounted 60 inches above the floor. Thermostat shall be located within the building to ensure uniform heating of the space.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

INSTALLATION

- A. Install all work according to manufacturer's recommendations.
- A. Installation shall be per all applicable codes.
- B. Install control wiring concealed and according to requirements specified in Division 16 sections.

END OF SECTION 15900

SECTION 16100 - WIRING METHODS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Building wires and cables and associated splices, connectors, and terminations for wiring systems rated 600 V and less, and twisted-pair cable; and raceways and boxes.

PART 2 - PRODUCTS

2.1 WIRES AND CABLES

Building Wires and Cables: Type XHWN/THWN copper conductor.

Connectors and Splices: Wiring connectors of size, ampacity rating, material, and type and class for application and for service indicated.

2.2 RACEWAYS

Provide metal conduit, tubing and fittings of types, grades, sizes and weights as indicated, minimum trade size $\frac{3}{4}$ ".

1. RMC - FS WW-C-0581 and ANSI C80.1.
2. IMC - FS WW-C-581
3. EMT - FS WW-C-563 and ANSI C80.3.
4. Aluminum conduit is not acceptable.
5. Provide fittings for each type of conduit as required.
6. Install service entrance conductors in RMC. For feeders under 600 volts, install feeders rated greater than 100 amps in RMC or IMC except that buried feeders shall be installed in non-metallic conduit. Circuits rated less than 100 amps shall be installed in EMT except in poured walls, with one side in contact with grade, below concrete slab on grade or in earth fill use non-metallic duct. In areas exposed to weather, moisture or physical damage, use RMC or IMC.

CONDUCTORS AND CABLES

1. Provide copper conductors for all applications rated less than 600 volts. Provide factory-fabricated conductors of sizes, ratings, materials and types indicated for each service. Where not indicated, provide proper selection to comply with project's installation requirements and NEC standards.
- C. Outlet and Device Boxes: UL listed and labeled sheet metal boxes.
1. Provide outlet boxes, junction boxes, pull boxes, conduit bodies, bushings, locknuts, knockout closures and miscellaneous boxes and fittings as required. Comply with NEC, NEMA, ANSI and other applicable codes.
 2. Interior outlet boxes shall be one piece, galvanized flat rolled sheet, minimum size 4"x4"x1 $\frac{1}{2}$ ". Provide accessories as required. Provide corrosion-resistant cast metal

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weatherproof outlet boxes as required.

D. Pull and Junction Boxes

1. Junction and pull boxes shall be of code-gage steel with screw on covers.
2. Provide galvanized cast-metal conduit bodies.
3. Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and malleable steel conduit bushings and offset connectors.

2.2 SUPPORTING DEVICES

- A. Provide supporting devices complying with manufacturer's standard materials, design and construction in accordance with published product information and as required for a complete installation.

PART 3 - EXECUTION

INSTALLATION

Install wires and cables according to the NECA's "Standard of Installation."

Wiring at Outlets: Install with at least 12 inches of slack conductor at each outlet.

Outdoors Wiring Methods: As follows:

Exposed: Rigid or intermediate metal conduit.
Concealed: Rigid or intermediate metal conduit.
Underground, Single Run: Rigid nonmetallic conduit.
Underground, Grouped: Rigid nonmetallic conduit.

Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid or Motor-Driven Equipment): Liquidtight flexible metal conduit.

Indoors Wiring Methods: As follows:

Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid or Motor-Driven Equipment): Flexible metal conduit, except in wet or damp locations use liquidtight flexible metal conduit.
Use armored cable and nonmetallic sheathed cable in applications allowed by NFPA 70.
Damp or Wet Locations: Rigid steel conduit.
Exposed: Electrical metallic tubing or rigid nonmetallic conduit.
Concealed: Electrical metallic tubing, electrical nonmetallic tubing, or rigid nonmetallic conduit.
Boxes and Enclosures: NEMA 250, Type 1, except in damp or wet locations use NEMA 250, Type 4, stainless steel.
Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
Conceal conduit and electrical metallic tubing, unless otherwise indicated, within finished walls, ceilings, and floors.

Use raceway fittings compatible with raceway and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

Raceways Embedded in Slabs: Install in middle third of the slab thickness where practical, and leave at least 1-inch concrete cover.

Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

Join raceways with fittings designed and approved for the purpose and make joints tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight. Use insulating bushings to protect conductors.

Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

Install raceway sealing fittings and locate at suitable, approved, accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings where required by the NEC.

Stub-up Connections: Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor.

Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

Install a separate green ground conductor in surface metal raceway from the junction box supplying the raceway to receptacle or fixture ground terminals.

END OF SECTION 16100

Lehi Maintenance Building

SECTION 16140 - WIRING DEVICES GENERAL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Types of wiring devices include receptacles, switches, cord caps and cord connectors.
- B. Submit Product Data.

1.2 SCOPE OF WORK

- A. Provide and install the following;
 - 1. Power
 - a. Provide new 200 amp panel at new building with disconnect.
 - b. Provide 20 amp outlets as follows:
 - i. One waterproof GFCI outlet each between each overhead door of building (exterior).
 - ii. outlets at 12' spacing (interior) in shop. (GFCI)
 - iii. 4 outlets in each office and reception.
 - iv. 1 GFCI outlet per bathroom.
 - v. Outlets as needed in break room
 - vi. Telephone and data as needed.
 - c. Provide power to overhead doors.

PART 2 - PRODUCTS

2.1 DEVICES

Provide factory-fabricated wiring devices in types and electrical ratings for applications indicated and complying with NEMA standards Pub. No. WD 1.

- B. Provide general-duty duplex receptacle ground-fault circuit interrupters, feed thru types capable of protecting connected downstream receptacles on a single circuit.
- C. General Purpose Wiring Devices: Comply with NEMA WD1.

Color: GALV..

Receptacles: UL 498, heavy-duty grade except as indicated otherwise.

Ground-Fault Circuit Interrupter Receptacles: UL 943, feed-through type, with integral NEMA 5-20R duplex receptacle; for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter.

Snap Switches: Quiet-type AC switches, 120/277 V, 20 A, complying with UL 20.

Wall Plates: Galvanized steel wall coverplates for all wiring devices.

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fastened with metal screws having heads matching plate color.

Multioutlet Assemblies: Comply with UL 5.

PART 3 - EXECUTION

INSTALLATION

Install devices and assemblies plumb and secure.

Mount devices flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

Protect devices and assemblies during painting.

Install wall plates when painting is complete.

END OF SECTION 16140

Lehi Maintenance Building

SECTION 16500 - LIGHTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submit Product Data for each fixture type, including lamps.
- B. Coordinate ceiling-mounted fixtures with ceiling construction.

PART 2 - PRODUCTS

2.1 LIGHT FIXTURES

- A. Provide and install the following;

1. Interior Lighting

- a. SHOP / STORAGE- Provide 6 lamp high bay industrial T-8 fluorescent fixtures. (Some will require emergency ballasts.)
- b. OFFICE AREAS - Provide 2 lamp surface mounted T-8 wraparounds
- c. Provide separate a/b switches for each room.
- d. Provide one exit sign fixtures at each man door.

2. Exterior Lighting

- a. Provide Type B fixtures as follows:

- i. (3) 250 watt wall pack fixtures on each long wall.
- ii. (1) 250 watt wall pack fixtures centered on short walls.
- iii. Mount at elevation 115'- 0".

- b. Provide emergency egress fixture at exterior man doors. Mount at 1'-6" above door head.

3. Lighting Control

- a. Provide photocell and override switch for all exterior lighting.
- b. Provide separate switches for interior and exterior lights. Lights and outlets on separate circuits.

PART 3 - EXECUTION

INSTALLATION

Set units plumb, square, and level with ceiling and walls, and secure.

Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer's written instructions.

Lehi Maintenance Building

END OF SECTION 16500